IPAC13

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The 4th International Particle Accelerator Conference

第四届国際粒子加速器會議

Shanghai China, 12-17 May 2013

Special Poster Session for Students and Judging of Best Student Posters

IPAC'13

Special Poster Session for Students and Judging of Best Student Posters

Sunday, 12 May, 2013
(Setting up from 13:30, Student Poster Prizes judging from 14:00 to 20:00)

Level 1 of the Convention Center, Areas Water (WA) and Wood (WO)
Water: Panels 023-066, Wood: Panels 001-069

Classification 1: Circular and Linear Colliders

Student Poster Panel SUPWA023

ID: 2968 – TUPFI012 ***HL-LHC: Integrated Luminosity and Availability*****, Andrea Apollonio (CERN, Geneva)**, Andrea Apollonio, Ruediger Schmidt, Benjamin Todd, Sigrid Wagner, Daniel Wollmann, Markus Zerlauth (CERN, Geneva) - The objective of LHC operation is to optimise the output for particle physics by maximising the integrated luminosity. An important constraint comes from the event pile–up for one bunch crossing that should not exceed 140 events per bunch crossing. With bunches every 25 ns the luminosity for data taking of the experiments should therefore not exceed 5*10e34 s-1cm-2. For the optimisation of the integrated luminosity it is planned to design HL-LHC for much higher luminosity than acceptable for the experiments and to limit the initial luminosity by operating with larger beam size at the collision points. During the fill, the beam size will be slowly reduced to keep the luminosity constant. The gain from luminosity levelling depends on the average length of the fills. Today, with the LHC operating at 4 TeV, most fills are terminated due to equipment failures, resulting in an average fill length of about 5 h. In this paper we discuss the expected integrated luminosity for HL-LHC as a function of fill length and time between fills, depending on the expected MTBF of the LHC systems with HL-LHC parameters. We derive an availability target for HL-LHC and discuss steps to achieve this.

Student Poster Panel SUPWA024

ID: 2836 - TUPFI002 ***Electron Cloud and Scrubbing Studies for the LHC*****, Giovanni Iadarola (Naples University Federico II, Napoli; CERN, Geneva)**, Giovanni Iadarola (Naples University Federico II, Napoli; CERN, Geneva), Gianluigi Arduini, Vincent Baglin, Hannes Bartosik, Juan Esteban Muller, Giovanni Rumolo, Elena Shaposhnikova, Laurent Tavian, Frank Zimmermann (CERN, Geneva), César Octavio Domínguez (CERN, Geneva; EPFL, Lausanne), Georfrey Humberto Israel Maury Cuna (CINVESTAV, Mexico City) - Electron cloud build-up resulting from beam-induced multipacting is one of the major limitations for the operation of the LHC with beams with close bunch spacing. Electron clouds induce unwanted pressure rise, heat loads on the beam screens of the superconducting magnets and beam instabilities. Operation with bunch spacing of 50 ns in 2011 and 2012 has required decreasing the Secondary Electron Yield of the beam screens below the multipacting threshold for beams with this bunch spacing. This was achieved by continuous electron bombardment induced by operating the machine with high intensity beams with 50 and 25 ns spacing during dedicated periods at injection energy (450 GeV) and at top energy (3.5 and 4 TeV). The evolution of the Secondary Electron Yield during these periods, at different sections of the machine, can be estimated by pressure, heat load and by bunch-by-bunch RF stable phase measurements. The experimental information on the scrubbing process will be discussed and a possible "scrubbing strategy" to allow the operation with 50ns and 25ns beams after the Long Shutdown in 2013-2014 will be presented.

Student Poster Panel SUPWA025

ID: 4363 - TUPME030 ***Emittance Reconstruction from Measured Beam Sizes,*** **Jorge Giner Navarro (IFIC, Valencia)**, Jorge Giner Navarro, Angeles Faus-Golfe, Javier Fuentes, Jesús Navarro, Javier Resta (IFIC, Valencia) - In this paper we analyze the projected emittance (2D) and the intrinsic emittance (4D) reconstruction method by using the beam size measurements at different locations. We have studied analytically the conditions of solvability of the systems of equations involved in this process and we have obtained some rules about the locations of the measurement stations to avoid unphysical results. Presently, simulations are being made to

test the robustness of the algorithm in realistic scenarios with high coupling and measurement errors. The special case of a multi-OTR system in ATF2 is being studied in much detail. The results of these studies will be very useful to better determine the location of the emittance measurement stations in the diagnostic sections of Future Linear Colliders.

Student Poster Panel SUPWA026
ID: 2337 - TUPME039 ***The Drive Beam Phase Stability in CTF3 and its Relation to the Bunch Compression Factor*****, Emmanouil Ikarios (CERN, Geneva),** Emmanouil Ikarios, Alexandra Andersson, Javier Barranco, Ben Constance, Roberto Corsini, Alexander Gerbershagen, Tobias Persson, Piotr Krzysztof Skowronski, Frank Tecker (CERN, Geneva) - The proposed Compact Linear Collider (CLIC) is based on a two-beam acceleration scheme. The energy needed to accelerate a low intensity "main" beam is provided by a high intensity, low energy "drive" beam. The precision and stability of the phase relation between two beams is crucial for the performance of the scheme. The tolerable phase jitter is 0.3 deg rms at 12GHz. For this reason it is fundamental to understand the main possible causes of the drive beam timing jitter. Experimental work aimed at such understanding was done in the CLIC Test Facility (CTF3) where a drive beam with characteristics similar to the CLIC one is produced. Several phase measurements allowed us to conclude that the main source of phase jitter is energy jitter of the beam transformed and amplified into phase jitter when passing through a magnetic chicane. This conclusion is supported by measurements done with different momentum compaction values in the chicane. In this paper the results of these several phase measurements will be presented and compared with expectations.

Student Poster Panel SUPWA027
ID: 2081 - MOODB203 ***The vSTORM Facility*****, Ao Liu (Fermilab, Batavia),** Ao Liu, Alan David Bross, David Neuffer (Fermilab, Batavia), Shyh-Yuan Lee (Indiana University, Bloomington, Indiana) - A facility producing neutrinos from muons that decay in a storage ring can provide an extremely well understood neutrino beam for oscillation physics and the search for sterile neutrinos. The “neutrinos from STOred Muons” (nuSTROM) facility is based on this idea. This facility will include a target station and secondary particle collection, pion transmission, stochastic injection, and a muon decay ring (designed for ~3.8 GeV/c muons), but no cooling or RF sub-systems. The injection scenario nuSTORM uses avoids the use of a separate pion decay channel and fast kickers, which is very cost effective. The design and simulation work of this facility will provide a detailed understanding of the neutrino flux and flavor that may be obtained and lends guidance on the design of the near and far detectors. This paper presents a detailed description of the injection scenario with full G4Beamline simulation results and discussions on possible options of a muon decay ring and its design progress.

Student Poster Panel SUPWA028
ID: 3579 - MOPWO010 ***Studies of Machine Protection for a Crab Cavity in the LHC*****, Bruce Yee-Rendon (CINVESTAV, Mexico City)**, Bruce Yee-Rendon, Ricardo Lopez-Fernandez (CINVESTAV, Mexico City), Tobias Baer, Javier Barranco, Rama Calaga, Aurelien Marsili, Stefano Redaelli, Rogelio Tomas, Frank Zimmermann (CERN, Geneva)
Crab cavities (CCs) apply a transverse kick that rotate the bunches so as to have a head-on collision at the interaction point (IP). Such cavities were successfully used to improve the luminosity of KEKB. They are also a key ingredient of the HL-LHC project to increase the luminosity of the LHC. As CCs can rapidly change the particle trajectories, machine protection studies are required to assess the

beam losses due to fast CC failures. In this paper, we discuss the effect of rapid voltage or phase changes in a CC for the HL-LHC layout using measured beam distributions from the present LHC.

Student Poster Panel SUPWA029
ID: 2902 - MOPWO029 ***A Remote Estimate of Collimator Jaw Damages with Sound Measurements during Beam Impacts*****, Daniel Deboy (CERN, Geneva),** Daniel Deboy, Oliver Aberle, Marija Cauchi, Jerome Lendaro, Alessandro Masi, Stefano Redaelli (CERN, Geneva), Ralph Wolfgang Assmann (DESY, Hamburg) - Irregular hits of high-intensity LHC beams on collimators can lead to severe damage of the collimator jaws. The identification of damaged collimator jaws by observation of beam measurements is challenging: online loss measurements at the moment of the impacts can be tricky and degradation of the overall performance from single collimator damage can be difficult to measure. Visual inspections are excluded because collimator jaws are enclosed in vacuum tanks without windows. However, the sound generated during the beam impact can be used to give an estimate of the damage level. In 2012, high-intensity beam comparable to a full nominal LHC bunch at 7 TeV was shot on a tertiary type LHC collimator at the HiRadMat test facility at CERN. The paper presents results from sound recordings of this experiment.

Main Classification 2 Synchrotron Light Sources and FELs

Student Poster Panel SUPWA030
ID: 2740 - MOPEA067 ***Ultra-low Emittance Upgrade Options for Third Generation Light Sources*****, Riccardo Bartolini (Diamond, Oxfordshire)**, Riccardo Bartolini (Diamond, Oxfordshire), Thapakron Pulampong (JAI, Oxford) - The increasing efforts in the synchrotron light sources community toward the design of a diffraction limited source at multi-keV photon energy have eventually stimulated the existing facilities to investigate possible upgrade paths to higher photon brightness and lower emittances to maintain their competitiveness within the users' community. We present a possible option for upgrading 3rd generation light sources based on a rebiuld of the arcs with MBA cells, using diamond as an example. Emphasis is given to the AP desing issues with a view to minimal changes to the machine layout, contained cost and minimal downtime

Student Poster Panel SUPWA031
ID: 2916 - MOPEA062 ***Metrology of the NESTOR Facility Equipment*****, Oleksandr Bezditko (NSC/KIPT, Kharkov),** Oleksandr Bezditko, Ivan Karnaukhov, Andriy Mytsykov, Alexander Reuzayev, Andrey Yurij Zelinsky (NSC/KIPT, Kharkov) - Development of X-ray generator NESTOR in the National Science Center Kharkov Institute of Physics and Technology will let significantly extend the scientific program of investigations that are carried out in NSC KIPT, will allow to increase an amount and improve quality of experimental researches in the field of physics and chemistry In this work tolerances for accuracy installation of the lattice elements of the complex are defined. The methods of lattice element position measurement were detected and ways of their realization were defined. These allow to realize the project parameters of NESTOR facility and, first of all, generated X-ray beam intensity.

Student Poster Panel SUPWA032
ID: 2164 - WEPWA020 ***Laser Electron Storage Ring for TTX*****, Haisheng Xu, (TUB, Beijing).** Haisheng Xu, Wenhui Huang, Chuanxiang Tang, Lixin Yan, Yan You (TUB, Beijing), Shyh-Yuan Lee (IUCEEM, Bloomington, Indiana) - Tsinghua Thomson scattering X-ray (TTX) source, proposed by Tsinghua University, is a hard x-ray source with multi-application in condensed matter physics, etc. The TTX is composed of an S-band photocathode RF gun and a SLAC type 3m travelling wave Linac, and a femto-second tera-watt laser system drives the photocathode. The TTX source is in operation. To extend the capability of TTX, we plan to design a ring based system to increase the photon flux. In this paper, we report the design of the compact electron storage ring and optical cavity, expected performance, and future prospects.

Student Poster Panel SUPWA033
ID: 2943 - WEPWA047 ***Longitudinal Stability of Multiturn ERL with Split Accelerating Structure*****, Yaroslav V. Getmanov (BINP SB RAS, Novosibirsk),** Yaroslav V. Getmanov, Oleg A. Shevchenko (BINP SB RAS, Novosibirsk), Nikolay Vinokurov (BINP SB RAS, Novosibirsk; KAERI, Daejon), Terry Atkinson (HZB, Berlin) - Some modern projects of the new generation light sources use the conception of multipass energy recovery linac with split (CEBAF-like) accelerating structures. One of the advantages of these light sources is the possibility to obtain a small longitudinal beam size. To help reduce it, the longitudinal dispersion should be non-zero in some arcs of the accelerator. However small deviations in voltages of the accelerating structures can be enhanced by induced fields from circulating bunches due to the dependence of the flight time on the energy spread and the high quality factor of the superconducting radio-frequency cavities. Therefore, instabilities related with interactions of the electron bunches and longitudinal modes

of the cavities can develop in the installation. Stability conditions for the interactions with fundamental accelerating mode of the split accelerating system are discussed. Numerical simulations are made for two projects - MARS and FSF.

Student Poster Panel SUPWA034
ID: 2091 - WEPWA038 ***Influence of Magnet Errors and Waveguide Permeability on Magnetic Field Performance in Pure Permanent Undulators*****, Xialing Liu (HUST, Wuhan),** Xialing Liu, Kaifeng Liu, Bin Qin, Ping Tan, Bang Wu, Yongqian Xiong, Lei Yang (HUST, Wuhan) - For pure permanent magnet (PM) undulator, unavoidable divergences of remanence field and magnetization vector in PM blocks and installation error will cause magnetic field error at the central line of the undulator. This paper presents the simulation results of the magnetic field in non-ideal undulator containing these errors, with specified tolerances in Normal distribution. As well as the peak field error, increases of the harmonic components and impact on field integrals are calculated. The influence on magnetic field caused by waveguide permeability is also discussed.

Student Poster Panel SUPWA035
ID: 3506 - WEPWA030 ***Using the Power Spectral Density Method to Characterize and Evaluate the X-ray Mirrors surfaces*****, Wenqiang Hua (SINAP, Shanghai),** Wenqiang Hua, Fenggang Bian, Yumei He, Weihao Lin, Li Song, Jie Wang, Nie Zhao (SINAP, Shanghai) - Rapid progress in synchrotron X-ray beams' coherence and X-ray optics performance places a high demand on characterization and evaluation of optical surface figure and slope errors and roughness on meter-long optics over spatial frequencies as short as 0.1mm. In this paper, the propagation model of hard X-ray beams through reflecting mirror surface is proposed based on wave-front propagation, and numerical simulations are performed for predicting the hard X-ray focusing performance of different imperfect mirrors using a Fresnel diffraction calculation. The imperfect mirror surface height maps synthesized from power spectral functions are used to analyze and evaluate the influences of different mirror surface errors on the reflected hard X-ray beam properties.

Main Classification 03 Particle Sources and Alternative Acceleration Techniques

Student Poster Panel SUPWA036

ID: 3730 - TUPEA072 ***Toward a Dielectric Wakefield Energy Doubler at ASTA*****, Francois Lemery (Northern Illinois University, DeKalb, Illinois)**, Francois Lemery, Daniel Mihalcea, Christopher Robert Prokop (Northern Illinois University, DeKalb, Illinois), Yin-E Sun (Fermilab, Batavia), Philippe Regis-Guy Piot (Fermilab, Batavia; Northern Illinois University, DeKalb, Illinois) - The Advanced Superconducting Test Accelerator (ASTA), presently under construction at Fermilab, will produce high-charge (~<3 nC) electron bunches with energies ranging from 50 to eventually 750 MeV. The facility is based on a superconducting linac capable of producing up to 3000 bunches in 1-ms macropulses repeated at 5 Hz. In this paper we explore the use of a short dielectric-lined-waveguide (DLW) linac to significantly increase the bunch energy. The method consists in (1) using advanced phase space manipulation techniques to shape the beam distribution and enhance the transformer ratio, and (2) optimize the generation and acceleration of a low-charge witness bunches. Start-to-end simulations of the proposed concept are presented. This DLW module could also be used to test some aspects of a recently proposed concept for a multiuser short-wavelength free-electron laser utilizing a series of DLW linacs*.

* C. Jing et al., "A Compact Soft X-ray Free-Electron Laser Facility based on a Dielectric Wakefield Accelerator", Advanced Photon Source LS Note LS-332, Argonne National Laboratory (2012).

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Student Poster Panel SUPWA037

ID: 3868 - TUPEA012 ***Rebunching Low Energy Neutrons by Magnetic Acceleration and Deceleration*****, Sohei Imajo (Kyoto University, Kyoto), Sohei Imajo (Kyoto University, Kyoto),** Peter Geltenbort (ILL, Grenoble), Yasushi Arimoto (KEK, Ibaraki), Yoshihisa Iwashita (Kyoto ICR, Uji, Kyoto), Masaaki Kitaguchi (Kyoto University, Osaka), Tamaki Yoshioka (Kyushu University, Fukuoka), Hirohiko M. Shimizu (Nagoya University, Nagoya), Yoshichika Seki (RIKEN Nishina Center, Wako) - Ultra cold neutrons (UCN) - neutrons with energies less than 300 neV - can be accelerated or decelerated by means of static magnetic and RF fields. Neutron have a magnetic dipole moment, and hence their kinetic energies vary depending on their spin in magnetic fields. Their kinetic energies are restored when they get out from the magnetic field area if their spin did not flip. A spin flip can be triggered by applying an RF field whose frequency coincides with the spin precession frequency of a neutron in this magnetic field. This allows to tune the kinetic energy of neutrons. This method can be used to rebunch a pulsed beam of neutrons to a storage bottle that can store UCN. By open and close the storage bottle synchronously with the rebuncher, high UCN densities can be achieved for precision measurements of neutron properties such as the Electric Dipole Moment. The method and experimental setup will be described in detail and the results of a recent first test experiments will be presented.

Student Poster Panel SUPWA038

ID: 2645 - TUPEA029 ***Theory Calculation of PASER in Gas Mixture Active Medium*****, Xiufang Tian (USTC/NSRL, Hefei, Anhui)**, Xiufang Tian, Cong-Feng Wu (USTC/NSRL, Hefei, Anhui) - In the PASER (particle acceleration by stimulated emission of

radiation), the energy is stored in an active medium and transferred directly to the electron beam passing through. In this paper, the wake-field generated by a bunch of electrons traversing in an active medium has been discussed. The calculations of the development of amplitude for gas mixture active medium about CO2 and ArF were made respectively. The results show that the gradient can reach around 1GeV/m. In addition, the energy exchange occurring as a train of electron micro-bunches traversing in gas mixture was analyzed by a two dimension model. The train of micro-bunches can obviously gain energy from the active medium and the energy exchange is linearly proportional to the interaction length d. The influence of the bunch figure and other quantities on the energy exchange occurring as a train of electron micro-bunches traversing CO2 gas mixture were investigated when the interaction length is 0.5m. The results illustrate that maximum energy gain can be obtained by the train of micro-bunches with optimized parameters.

Student Poster Panel SUPWA039

ID: 1968 - TUPEA055 ***Quasistatic Field Influence on Bunches Focusing by Wakefields in the Plasma-dielectric Waveguide*****, Roman Romanovich Kniaziev (KhNU, Kharkov),** Roman Romanovich Kniaziev (KhNU, Kharkov), Gennadiy V. Sotnikov (NSC/KIPT, Kharkov) - Acceleration of charged particles by wakefields, excited by a drive electron bunch in the dielectric waveguide, is a perspective method in accelerator physics. We have previously proposed using plasma, filling the drift channel of the dielectric structure (DS), for focusing of the accelerated bunch*. The analytical expressions, obtained for the components of the electromagnetic field, considered only the propagating wake field, and did not consider quasi-static fields of electron bunches that are important for calculating bunches dynamics. In this paper we report the result of numerical calculations of the influence of quasistatic field of bunches on focusing by wake fields in the plasma-dielectric accelerator. We refine analytical expressions for the electromagnetic field by adding components of bunch quasi-static fields and show the correlation of total force and their quasi-static components.

* R.R. Knyazev, G.V. Sotnikov. Focusing of accelerated particles by wakefields of a drive bunch in a plasma-dielectric waveguide. Proc. of IPAC2012, New Orleans, Louisiana, USA, paper weppp003.pdf

The research is supported in part by Global Initiatives for Proliferation Prevention (GIPP) program, project ANL-T2-247-UA (STCU Agreement P522).

Student Poster Panel SUPWA040

ID: 3531 - TUPEA024 ***"Double Rings Dancing" in Phase Space: A Novel Phenomenon of Laser Plasma Ion Acceleration in the RPA Regime*****, Yang Wan (TUB, Beijing),** Yang Wan, Ying-Chao Du, Jianfei Hua, Wenhui Huang, Fei Li, Chuanxiang Tang, Yipeng Wu, Xinlu Xu, Lixin Yan, Chaojie Zhang (TUB, Beijing), Wei Lu (TUB, Beijing; UCLA, Los Angeles, California), Chan Joshi, Warren Mori (UCLA, Los Angeles, California) - In the RPA process of ultrahigh-contrast circularly polarized laser pulses interaction with ultrathin foils, laser contrast has important influence on this acceleration process. Through 1D and 2D particle simulations, we studied the impact of picosecond pre-pulses on ultrathin foils and on the subsequent ion acceleration when main pulses arrives. In the study, we found two interesting phenomena, one is that target forms unique bimodal structure after interacting with pre-pulses, and the other is that double rings appears in proton phase when the foils irradiated by main pulses. In the process of understanding these phenomena, we successfully constructed a one- dimensional analytical model – sliced acceleration to describe pre-pulses interaction with thin foils. Then we also find CP laser standing wave structure can push electrons to pull the whole foil to accelerate stably, which is the key reason

of double rings. These models make a good explanation of physical phenomena occurring. In our words, the two studies mentioned above, with solving the "double rings" problem, also fill some blank parts in CP laser interaction with foils, which have a great of subsequent research value.

Student Poster Panel SUPWA041
ID: 3420 - TUPEA026 ***Emittance Growth and Saturation in Ionization Induced Injection of Plasma Based Wakefield Accelerators*****, Xinlu Xu (TUB, Beijing),** Xinlu Xu, Jianfei Hua, Fei Li, Wei Lu, Chuanxiang Tang (TUB, Beijing) - High quality controlled injection is critical for future key applications of plasma based wakefield accelerators. As a very promising controlled injection method, ionization induced injection has attracted significant experimental and theoretical interests recently. In this paper, we present new results from OSIRIS simulations and analytical theory on the beam dynamics of the injected beam formed via ionization induced injection for both laser and electron beam driven wakes (LWFA and PWFA). Transverse and longitudinal mixing occurs as electrons created in the middle of the accelerating structure slip backwards to the rear of the bubble as they get trapped. The injection and trapping process induces emittance growth of the injection beam. We discuss thoroughly the influence of the injection distance, the acceleration distance, wakefield structure and nonlinear space charge force on the emittance of the injected beam. OSIRIS simulation is present to support our theory.

Student Poster Panel SUPWA042
ID: 3241 - TUPEA027 ***Snapshots Plasma Wakefield Using Ultrashort Electron Probe*****, Chaojie Zhang (TUB, Beijing),** Chaojie Zhang, Ying-Chao Du, Jianfei Hua, Wenhui Huang, Fei Li, Wei Lu, Chuanxiang Tang, Xinlu Xu, Lixin Yan (TUB, Beijing), Yuqiu Gu (Laser Fusion Research Center, Mianyang), Chan Joshi, Warren Mori (UCLA, Los Angeles, California) - Wakefields generated by ultra-short intense laser pulses or charged particle bunches are tiny structures comparing with the traditional RF accelerators, with a typical size around tens of microns. To mapping out the field structure inside these light speed moving bubbles is a challenge. Differing from optical method, an ultra-short electron beam synchronized with the laser driver pulse can be used as a probe for the field structure. We have checked this possibility by performing a series of 3D PIC simulations using OSIRIS. The results will be presented and possible future experimental test at Tsinghua University will also be discussed.

Student Poster Panel SUPWA043
ID: 2184 - TUPEA019 ***Resonance Electrons Driving Ion Acceleration*****, Shuan Zhao (PKU/IHIP, Beijing),** Shuan Zhao, Chen Lin, Xueqing Yan (PKU/IHIP, Beijing) - Resonance Electrons Driving Ion Acceleration S. Zhao, C. Lin, X. Q. Yan Institute of Heavy Ion Physics, Peking University Proton acceleration driven by resonance electrons is proposed. Energetic electron beam generated through direct laser acceleration in the near critical dense plasma is dense and directional. When interacting with a thin foil target, resonance electrons can transmit the target and drive periodical electrostatic field at the back surface, therefore protons are more efficiently accelerated in a much longer distance in propagation direction of resonance electrons, compared to the classical target normal sheath acceleration. For a Gaussian laser pulse with pulse duration of 80fs, peak intensity $I=1.38*10^{8}W/cm^{2}$, the cutoff energy of the output collimated proton beam is 14MeV, enhanced by a factor of 3 or 4. The scaling law predicts hundreds MeV Proton beam can be generated in laser intensity of $10^{20}W/cm^{2}$.

Student Poster Panel SUPWA044
ID: 2168 - MOPFI035 ***Preliminary Results of H2+ Beam Generated by a 2.45 GHz Permanent Magnet ECR Ion Source at PKU*****, Yuan Xu (PKU/IHIP, Beijing),** Yuan Xu, Jia Chen, Jia-er Chen, Zhiyu Guo, Yuting Luo, Shi Xiang Peng, Haitao Ren, Ziheng Wang, Tao

Zhang, Jie Zhao (PKU/IHIP, Beijing), Ailin Zhang (Graduate University, Beijing) - Recently, the need to build an ion source generating high current hydrogen molecular ion H2+ beam has been growing rapidly. For example, H2+ ion can be used as a pilot beam of the intense deuteron beam during the commission phase of linear accelerators to minimize the activation of components. And it is an effective way to improve the output current of cyclotrons by accelerating H2+ and stripping it into H+ at the exit of accelerator, instead of accelerating H+ beam directly. To obtain high-yield H2+ ion beam, experimental and theoretical study was carried out on the 2.45 GHz Peking University permanent magnet electron cyclotron resonance ion source (PKU PMECR). With PMECR II*, studies on the size of discharge chamber and the operation pressure were carried out to increase H2+ ion fraction. Beam analysis results prove that the H2+ can reach 40.5% with suitable operation parameters. More details will be presented in this paper.

* Zhizhong Song, Shixiang Peng et al., Rev. Sci. Instrum. 77, 03A305 (2006)

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Student Poster Panel SUPWA045

ID: 2331 - MOPFI047 ***Analysis and Design of Matching Unit for a RF Driven Plasma Source for Fusion Purpose*****, HaiKun Yue (Huazhong University of Science and Technology (HUST), Wuhan),** HaiKun Yue (Huazhong University of Science and Technology(HUST), Wuhan), DeZhi Chen, Dong Li (HUST, Wuhan) - A RF driven plasma exciter for producing negative ions, aiming for heating and current drive neutral beam injectors for fusion applications, is in developing in Huazhong University of Science and Technology (HUST). In order to couple the maximum RF power to the source, the matching unit is designed to match the impedance of the source to that of the RF coaxial line. Firstly, a FEM model was built to estimate the equivalent circuit parameters of the source. Numerical predictions were compared with a small experimental setup to verify the accuracy of the fem model. Based on the numerical results, the RF coil and the matching components were carefully designed. Finally, the matching circuit for the source is developed and tested. Experimental results will be presented in the full paper.

Student Poster Panel SUPWA046

ID: 2630 - MOPFI036 ***Study of the Cold Cathode RF Electron Gun Based on Doped Diamond Films at CAEP*****, Xiangkun Li (TUB, Beijing)**, Xiangkun Li (TUB, Beijing), Wei Bai, Ming Li (CAEP/IAE, Mianyang, Sichuan) - Diamond relevant materials have been considered as a promising field emission cathode in recent years. High current density can be obtained either by diamond field emission arrays or by doped diamond films under electrical strengths of several decades of MV/m. Based on the doped films a half cell S-band electron gun has been designed and constructed at CAEP. The gun can provide an accelerating gradient of 60-80 MV/m on the cathode surface (6 mm in diameter). Simulations have proven good performance of such a gun but it needs confirmed by further experiments. Details of the experiments and comparisons with simulations will be reported.

Student Poster Panel SUPWA047

ID: 2668 - MOPFI045 ***Studying of Multipacting in Micro-pulse Electron Gun*****, Lang Liao (SINAP, Shanghai),** Lang Liao, Wencheng Fang, Qiang Gu, Meng Zhang, Minghua Zhao (SINAP, Shanghai) - Depending on the complexity of multipacting phenomenon, more works are focused on the occurrence of multipacting in the micro-pulse electron gun. In this paper, the multipacting resonance condition is determined in a reentrant cavity model of the gun. The resonance parameters work as the input for VORPAL simulations in order to achieve a steady state saturation in the cavity. The simulation results showed that the gun can

give rise to electrons beam with high currents and short pulses.

Student Poster Panel SUPWA048
ID: 2476 - MOPFI058 ***Studies of Cs3Sb Cathodes for the CLIC Drive Beam Photoinjector Option*****, Irene Martini (CERN, Geneva),** Irene Martini, Eric Chevallay, Steffen Doebert, Valentin N. Fedosseev, Christoph Hessler, Mikhail Martyanov (CERN, Geneva) - Within the CLIC (Compact Linear Collider) project, feasibility studies of a photoinjector option for the drive beam as an alternative to its baseline design using a thermionic electron gun are on-going. This R&D program covers both the laser and the photocathode side. Whereas the available laser pulse energy in ultra-violet (UV) is currently limited by the optical defects in the 4th harmonics frequency conversion crystal induced by the 0.14 ms long pulse trains, recent measurements of Cs3Sb photocathodes sensitive to green light showed their potential to overcome this limitation. Moreover, using visible laser beams leads to better stability of produced electron bunches and one can take advantages of the availability of higher quality optics. The studied Cs3Sb photocathodes have been produced in the CERN photoemission laboratory using the co-deposition technique and tested in a DC gun set-up. The analysis of data acquired during the cathode production process will be presented in this paper, as well as the results of life-time measurements in the DC gun.

Student Poster Panel SUPWA049
ID: 3510 - MOPFI070 ***Spallation is not the only Fruit: Producing Neutrons using Low Energy Fusion Reactions*****, Simon Christopher Paul Albright (University of Huddersfield, Huddersfield),** Simon Christopher Paul Albright, Rebecca Seviour (University of Huddersfield, Huddersfield) - There is an increasing interest in multiple areas of industry in possible applications of neutrons. The majority of neutron work is performed at national and international level research institutions with either research reactors or spallation sources. Smaller portable sources using either a small contained fissile isotope or sealed fusors which either use, or produce, tritium. As an alternative to the cost of large facilities and the radio-toxicology of portable sources currently available research is being performed with an aim to produce a fusion based neutron source with neither of these concerns. Simulations of low energy proton reactions with light nuclei simulated with MCNPX and Geant4 are compared with experiment. It is shown that MCNPX is able to accurately reproduce (p,n) reactions for a number of light elements.

Student Poster Panel SUPWA050
ID: 2627 - WEPEA029 ***The Lattice Design of SHER in HIAF*****, Xiang Gao (IMP, Lanzhou),** Xiang Gao (IMP, Lanzhou) - HIAF is the next generation accelerator complex under construction by IMP (Institute of Modern Physics), and SHER is one of the rings used for mass measurement. SHER is a dedicated storage ring. Its architecture is governed by the electron-cooling of secondary particles and rare isotopes. The complex will be built in the next few years, and the optimization process of the machine is under way.

Student Poster Panel SUPWA051
ID: 3563 - WEPEA064 ***SixTrack-Fluka Active Coupling for the Upgrade of the SPS Scrapers*****, Alessio Mereghetti (CERN, Geneva),** Alessio Mereghetti, Francesco Cerutti, Riccardo De Maria, Brennan Goddard, Verena Kain, Malika Meddahi, Oznur Mete, Yannis Papaphilippou, David Pastor Sinuela, Vasilis Vlachoudis (CERN, Geneva), Robert Appleby (UMAN, Manchester) - The LHC Injectors Upgrade (LIU) Project aims at upgrading the systems in the LHC injection chain, to reliably deliver the beams required by the High-Luminosity LHC (HL-LHC). Essential for the clean injection into the LHC, the SPS scrapers are one of the important systems under revision. In order to take into account of the effect of betatron and longitudinal beam dynamics on energy deposition patterns, and nuclear and Coulomb scattering in the absorbing medium onto loss patterns, the SixTrack and Fluka codes have been coupled, profiting from the best of the refined physical models they respectively embed. The coupling envisages an active exchange of tracked particles between the two codes at each turn, and an on-line aperture check in SixTrack, in order to estimate the local cleaning inefficiency of the system. Knob-like, time-dependent strengths have been implemented in SixTrack, since the designed scraper system foresees the use of a magnetic bump. The study is intended to assess the robustness of the proposed scraper as well as its effectiveness with respect to the desired performance.

Student Poster Panel SUPWA052
ID: 2595 - WEPEA031 ***Design of a Low Energy Heavy Ion Synchrotron for Space Irradiation*****, Jian Shi (IMP, Lanzhou),** Jian Shi, Weiping Chai, Jia Wen Xia, Jiancheng Yang (IMP, Lanzhou) - A heavy ion synchrotron with the max rigidity of 2.75 Tm is designed for space irradiation. FODO structure is adopted since it is the simplest structure. Slow extraction is the basic and essential function for the space irradiation. The design philosophy of the synchrotron and the preliminary design of the slow extraction is introduced in this paper.

Student Poster Panel SUPWA053
ID: 2422 - THPWO015 ***First Coupled CH Power Cavity for the FAIR Proton Injector*****, Robert Brodhage (IAP, Frankfurt am Main),** Robert Brodhage, Ulrich Ratzinger (IAP, Frankfurt am Main), Gianluigi Clemente, Wolfgang Vinzenz (GSI, Darmstadt) - For the research program with cooled antiprotons at FAIR a dedicated 70 MeV, 70 mA proton injector is required. The main acceleration of this room temperature linac will be provided by six CH cavities operated at 325 MHz. Each cavity will be powered by a 2.5 MW Klystron. For the second acceleration unit from 11.5 MeV to 24.2 MeV a 1:2 scaled model has been built. Low level RF measurements have been performed to determine the main parameters and to prove the concept of coupled CH cavities. In Summer 2012, the assembly and tuning of the first power prototype was finished. Until then, the cavity was tested with a preliminary aluminum drift tube structure, which was used for precise frequency and field tuning. Before Spring 2013 the final drift tube structure will be welded inside the main tanks and the preparation for copper plating will take place.

This paper will report on the main tuning and commissioning steps towards that novel type of DTL and it will show the latest results measured on a fully operational CH proton cavity.

Student Poster Panel SUPWA054
ID: 2592 - THPWO049 ***Preliminary Beam Dynamics and Structure Design of One 50mA/CW RFQ with Ramped Inter-vane Voltage*****, Lei Du (TUB, Beijing),** Lei Du, Xialing Guan, Chuanxiang Tang, Qingzi Xing (TUB, Beijing) - The beam dynamics and structure design of a ramped-voltage CW RFQ (Radio Frequency Quadrupole) accelerator for a NSFC (National Natural Science Foundation of China) Project at Tsinghua University is presented in this paper. The ramped-voltage RFQ, in which the inter-vane voltage increases from the low-energy end to the high-energy end, is compact and efficient. In this RFQ, the operating frequency is 325 MHz and the final energy is 3 MeV with an input energy of 50 keV. After optimization, the total length is as short as 2.9 m and the transmission rate is above 97%. The design of RFQ structure including the undercuts will also be shown.
Work supported by National Natural Science contracte Foundation of China (Major Research Plan Grant No. 91126003 and Project 11175096).

Student Poster Panel SUPWA055
ID: 2497 - THPWO016 ***Superconducting CH Cavities for Heavy Ion Acceleration*****, Florian Dirk Dziuba (IAP, Frankfurt am Main),** Florian Dirk Dziuba, Marco Busch, Holger Podlech, Ulrich Ratzinger (IAP, Frankfurt am Main), Winfried A. Barth, Sascha Mickat (GSI, Darmstadt; HIM, Mainz), Michael Amberg (HIM, Mainz; IAP, Frankfurt am Main), Kurt Aulenbacher (HIM, Mainz; IKP, Mainz) - To demonstrate the operation ability of superconducting (sc) Crossbar-H-mode (CH) cavity technology a 217 MHz structure of this type is under development at the Institute for Applied Physics (IAP) of Frankfurt University. The cavity has 15 accelerating cells and a design beta of 0.059. It will be equipped with all necessary auxiliaries like a 10 kW power coupler and a tuning system. Currently, the cavity is under construction. Furthermore, this cavity will serve as demonstrator for a sc continuous wave (cw) LINAC at GSI. The proposed cw LINAC is highly requested to fulfil the requirements of nuclear chemistry and especially for a competitive production of new Super Heavy Elements (SHE) in the future. A full performance test by injecting and accelerating a beam from the GSI High Charge Injector (HLI) is planned in 2014. The current status of the sc CH cavity and the demonstrator project is presented.
Work supported by HIM, GSI and BMBF Contr. No. 06FY7102

Student Poster Panel SUPWA056
ID: 2302 - THPWO042 ***Macroparticle Simulation Studies of a Beam-core Matching Experiment*****, Hongping Jiang (IHEP, Beijing),** Hongping Jiang, Shinian Fu (IHEP, Beijing) - We compared the 3-D nonlinear macro-particle code IMPACT simulation results with the measured beam-core profiles obtained by the wire scanners in the beam halo experiment. Quadrupole scans were used to determinate transverse properties of the RFQ output beam. The Gaussian distribution was chosen as the initial particle distribution, which is well fit with the measured beam-core profile. We matched the beam using the least-squares fitting procedure that adjusted the first four matching quadrupoles to produce equal rms beam size in the last six wire scanners. Simulations had been fairly successful in reproducing the core of the measured matched-beam profiles.

Student Poster Panel SUPWA057
ID: 2415 - THPWO047 ***The LLRF Cavity Measurement for the SSC-LINAC RFQ*****, Ge Liu (PKU/IHIP, Beijing),** Ge Liu, Shu Li Gao, Yuanrong Lu (PKU/IHIP, Beijing), Xiaonan Du, Yuan He, Gang Pan, Yaqing Yang, Youjin Yuan, Zhouli Zhang (IMP, Lanzhou) - The manufacturing process of the SSC-LINAC

RFQ went to end and the LLRF measurement has been done. The frequency of the RFQ is 53.557 MHz without tuning, which is not far from the design value 53.667 MHz. The unflatness of the field along the beam axis is less than ±4%, which meets the simulation results. The dipole field is in the acceptable margin as well. The frequency will be adjusted by tuning plungers in operation. In this paper, the field distribution along the cavity has been measured and compared with the modulated electrodes simulation. The difference and its influences on the beam transmission have been analyzed.
Supported by NSFC(11079001)

Student Poster Panel SUPWA058
ID: 2173 - THPWO044 ***Error Analysis and Beam Loss Control in C-ADS Main Linac*****, Cai Meng (IHEP, Beijing),** Cai Meng, Zhihui Li, Jingyu Tang, Fang Yan (IHEP, Beijing) - The China ADS (C-ADS) driver linac is defined to deliver a CW proton beam of 1.5 GeV in energy and 10 mA in current. To meet the extremely high reliability and availability, it is very important and imperative to perform detailed error analysis to simulate the real machine, where the errors always exist. The error studies are by very intense macro-particle simulations by both Trace-Win and TRACK codes with space charge effects included. Through error analysis the proper closed-orbit correction scheme and the maximum tolerable hardware and alignment errors can be found. This paper presents the method to optimize the apertures of elements in the C-ADS main linac. According to the detailed sensitivity analysis of different errors, the static and dynamic errors for the main linac are proposed. The basic lattice scheme has also been re-optimized based on the error studies. The correction scheme is also described, and with the correction scheme the residual orbit can be controlled very well. The influence of the correctors and BPM failures on the correction scheme is also studied.

Student Poster Panel SUPWA059
ID: 2572 - THPWO059 ***The Design of the Main Accelerating Section with KONUS Structure in CSR-Linac*****, Xiaohu Zhang (IMP, Lanzhou)**, Xiaohu Zhang (IMP, Lanzhou) - The CSR-LINAC injector as the Cooling Storage Ring (CSR) has been proposed in Heavy Ion Research Facility in Lanzhou (HIRFL). The new injection linac is consist of LEBT (Low Energy Beam Tranfer), RFQ (Radio Frequency Quadrupole), MEBT (Middle Energy Beam Tranfer), DTL (Drift Tube Linac) and HEBT (High Energy Beam Tranfer). In this design, the KONUS Structure is adopted in the main accelerating section and will accelerate 238U34+ from 300 kev/u to 7 Mev/u. The designed beam intensity is 0.2 mA and the trnsmission efficiency can reach 95%. The detailed design scheme will been shown in this paper.

Student Poster Panel SUPWA060
ID: 1983 - MOPEA042 Stochastic Cooling, Xuejing Hu (IMP, Lanzhou), Xuejing Hu (IMP, Lanzhou) - Stochastic cooling by the use of a feedback system, aims at cooling of secondary particles or particles with large emittance or momentum spread. My research is mainly on the simulation of horizontal and longitudinal stochastic cooling process. The purpose of my work is to obtain the optimum parameters for stochastic cooling,according the actual accelerator lattice. Pickup and preamplifier are already installed on the CSRe, and preliminary results are get.

Student Poster Panel SUPWA061
ID: 2890 - MOPWO057 ***A Precise Beam Dynamics Model of the PSI Injector 2*****, Anna Maria Kolano (University of Huddersfield, Huddersfield),** Anna Maria Kolano, Roger John Barlow (University of Huddersfield, Huddersfield), Andreas Adelmann, Christian Baumgarten, Rudolf Dölling, Martin Humbel, Hui Zhang (PSI, Villigen) - The Injector 2 at PSI (Paul Scherrer Institut), is a 72 MeV separate sector cyclotron producing a high

intensity proton beam up to 3 mA CW, which is subsequently injected to the 590 MeV Ring Cyclotron. The injection energy of the pre-bunched beam is 870 keV at an intensity of 10 to 11 mA. In this paper we describe a full 3D model of the PSI injector 2, starting just before the two bunchers and including the multi stage collimation scheme in the cyclotron. The precise beam dynamics model is based on the OPAL (Object Oriented Parallel Accelerator Library) simulation code. OPAL is a tool for charged-particle optic calculations in large accelerator structures and beam lines including 3D space charge. The presented model will be validated with data from radial profile measurements and loss rates from the collimators and the electrostatic septum in the Injector 2. Based on this model we will estimate the intensity limit of this machine and comment of future operation modes.

Student Poster Panel SUPWA062

ID: 2650 - MOPFI042 ***The Simulation of Flattop Accelerated Beam on Cyclotrons*****, LeiTai Shi (IMP, Lanzhou),** LeiTai Shi (IMP, Lanzhou) - The paper introduces the simulation of the flattop acceleration beam on cyclotrons. It is useful for reduce the energy spread that using this accelerated mode. And It is helpful for the single turn extraction. At the same time, the transmission efficiency of the injected beam is slightly increased.

Student Poster Panel SUPWA063

ID: 2788 - MOPEA035 ***Heavy Ion Beam Acceleration from Very Low Energy in KEK Digital Accelerator*****, Takashi Yoshimoto (TIT, Yokohama),** Takashi Yoshimoto (TIT, Yokohama), Teruo Arai, Eiichi Kadokura (KEK, Ibaraki), Toshikazu Adachi (KEK, Ibaraki; Sokendai, Ibaraki), Ken Takayama (KEK, Ibaraki; TIT, Yokohama; Sokendai, Ibaraki), Taiki Iwashita, Kohji Okazaki (Nippon Advanced Technology Co. Ltd., Ibaraki-prefecture), Xingguang Liu (TIT, Yokohama; KEK, Ibaraki), Yuji Barata (Tokyo City University, Tokyo) - Heavy ion beams have been accelerated with induction acceleration devices in KEK digital accelerator (DA), which is a small scale rapid-cycling induction synchrotron with a repetition of 10 Hz. It has been confirmed that the beams survive until the extraction timing of 50 msec*. A wide variety of ion species such Ar, Ne, O, N, and He ion generated in the ECR ion source, which is embedded in the high voltage platform of 200 kV, are directly injected to the KEK-DA ring and accelerated to high energy region of a few tens of MeV. Acceleration and beam confinement by pulse voltages are separately realized by two type induction acceleration systems, which consist of the induction cell (pulse transformer) and switching power supply (SPS) to drive the cells**. Beam handing in the longitudinal direction including acceleration and confinement is simply maneuvered by controlling of tuning on/off of the solid-state switching element of the SPS. For this purpose, the fully programmed acceleration control system based on the FPGA has been developed. In this paper, a unique acceleration scheme for a rapid cycle synchrotron is presented with experimental data and simulation result.

* K.Takayama et al., to be submitted to Phys. Rev. Lett. (2012).

K.Takayama et al., in this conference (2012).

** T.Iwashita et al., Phys. Rev. ST-AB 14, 071301(2011).

Student Poster Panel SUPWA064

ID: 3805 - MOPEA065 ***Commissioning of the Ion Source for Siemens Novel Electrostatic Accelerator*****, Heinrich von Jagwitz-Biegnitz (JAI, Oxford)**, Heinrich von Jagwitz-Biegnitz (JAI, Oxford), Dan Faircloth (STFC/RAL/ISIS, Chilton, Didcot, Oxon), Paul Beasley, Oliver Heid, Andrew Holmes, Robert Gregory Selway (Siemens AG, Erlangen) - Siemens is developing a novel compact DC electrostatic tandem accelerator and currently building a prototype. A dedicated H- ion source for this accelerator has been designed and built. This paper reports on some of the design features as well as results of the commissioning phase of

this filament driven DC multicusp volume H- ion source. Stable H- currents of more then 300 microA at 10 keV have been extracted. This satisfies the beam current requirement of the novel accelerator.

Student Poster Panel SUPWA065
ID: 2703 - MOPEA040 ***Study of Geometry Dependent Multipacting of a Superconducting QWR*****, Kui Zhou (PKU/IHIP, Beijing),** Kui Zhou, Liu Yang (PKU/IHIP, Beijing) - A superconducting quarter wave resonator (QWR) of frequency=162.5 MHz and β=0.085 has been designed at Peking University. The multipacting (MP) simulation and analysis for the QWR with CST Particle Studio has been finished. The simulation results reveal that there is no sign of MP during its normal operating accelerating gradients in the range of 6-8 MV/m. The accelerating gradient range during which MP may occur is from about 1.4 to 3.2 MV/m, and the locations where MP may be encountered are mainly focused at the top part of the QWR. So the effect that different top geometries have on MP has also been studied in depth. Several typical round roofs and plane roofs are taken into account. Our results show that inward convex round roof is better than other round roofs, and plane roofs have an advantage over round roofs on the suppression of MP in general.
The Major Research Plan of National Natural Science Foundation of China

Student Poster Panel SUPWA066
ID: 2115 - MOPFI033 ***Commissioning Results and Progress of a Helium Injector for Coupled RFQ and SFRFQ Project at Peking University*****, Jia Chen (PKU/IHIP, Beijing),** Jia Chen, Jia-er Chen, Shu Li Gao, Zhiyu Guo, Shi Xiang Peng, Haitao Ren, Zhi Wang, Yuan Xu, Ailin Zhang, Tao Zhang, Jie Zhao (PKU/IHIP, Beijing) - At Peking University (PKU) a new helium injector for coupled radio frequency quadrupole(RFQ) and separated function radio frequency quadrupole(SFRFQ) within one cavity, so called as coupled RFQ & SFRFQ, was designed recently*. It will provide a 30keV 20mA He+ beam whose emittance is less than 0.15 π.mm.mrad for the accelerator. It is a combination of a 2.45GHz PKU PMECRIS (Permanent Magnet ECRIS) and a 1.16 m long LEBT. Within the 1.16 m LEBT, 2 solenoids, 2 steering magnets, a kicker, a space charge compensation section, a collimator, two vacuum valves, a Faraday cup and an ACCT are installed. The manufacture has been completed and the commissioning is on the way. In this paper we will address the commissioning results and its progress.
* Haitao Ren, et al., A Helium Injector for Coupled RFQ and SFRFQ Cavity Project at Peking University. Proc. LINAC'12, Paper TUPB034, Israel, 2012

Main Classification 5 Beam Dynamics and Electromagnetic Fields

Student Poster Panel SUPWO001
ID: 1970 - TUPWO034 ***Emittance Compensation in a S-band Traveling-wave Linac*****, Qushan Chen (HUST, Wuhan),** Qushan Chen, Qiang Fu, Tongning Hu, Bin Qin, Ping Tan, Bang Wu, Yongqian Xiong, Han Zeng (HUST, Wuhan), Ji Li (USTC/NSRL, Hefei, Anhui) - For a linac-based Free Electron Laser (FEL), the performance depends on the quality of electron beams generated by the injector linac. The injector consists of an electron gun and a series of traveling-wave accelerating cells, which are operated at 2856 MHz and accelerates the beam energy to 10~14MeV. For low energy beam, space-charge will cause emittance growth, and focusing magnet should be installed around the tube to compensate this effect. Poisson code was used for magnet design and calculation, as well as the beam dynamic simulations were performed for validation of emittance compensation.

Student Poster Panel SUPWO002
ID: 2704 - TUPWO030 ***Beam-based Alignment for the SXFEL*****, Duan Gu (SINAP, Shanghai),** Duan Gu, Dazhang Huang, Minghua Zhao (SINAP, Shanghai) - In linear accelerators, dispersion caused by quadrupole misalignment and transverse wake-field effect caused by alignment errors of accelerate structures will lead to a significant emittance growth. There are more stringent restrictions on SXFEL, the traditional optical alignment can no longer meet its requirements, but the Beam-Based Alignment(BBA) method allows more precise alignment, further reduce the Linac errors to meet SXFEL requirements .In undulator sections, orbit changes are not only caused by misalignments of quadrupole magnet position ,but also the errors of undulator magnetic. In order to achieve alignment accuracy over longer distance, we measuring BPM data under different conditions and using SVD algorithm for calculation and analysis, we can get the quadrupole magnet errors and BPM offset. With the method above, software based on MATLAB has been designed and compared the results with other software.

Student Poster Panel SUPWO003
ID: 2228 - THOBB101 ***Transverse-to-longitudinal Emittance Exchanger at Fermilab's Advanced Superconducting Test Accelerator*****, Christopher Robert Prokop (Northern Illinois University, DeKalb, Illinois),** Christopher Robert Prokop (Northern Illinois University, DeKalb, Illinois), Philippe Regis-Guy Piot (Fermilab, Batavia; Northern Illinois University, DeKalb, Illinois), Bruce Carlsten (LANL, Los Alamos, New Mexico) - Earlier experiments at Fermilab's A0 Photoinjector Laboratory demonstrated successful transverse-to-longitudinal emittance exchange (EEX) using a transverse-deflecting cavity (TDC) located between two identical doglegs. Such a design has the disadvantage of transversely displacing the beam. An interesting alternative is an EEX beamline designed out of a variable R56 bunch compressor chicane. In this paper, we present design and simulation testing for a chicane-based EEX for eventual implementation at Fermilab's Advanced Superconducting Test Accelerator. We explore several advanced EEX concepts, including bunch current profile shaping, bunch compression, and dispersion-boosting to relax the requirements on TDC power and cooling.
LANL LDRD program, project 20110067DR U.S. DoE under Contract No. DE-FG02-08ER41532 with Northern Illinois University and under Contract No. DE-AC02-07CH11359 the Fermi Research Alliance, LLC.

Student Poster Panel SUPWO004
ID: 2772 - TUPME024 ***Re-optimization of the Final Focus Optics with Vertical Chromatic Correction*****, Yiwei Wang (IHEP, Beijing),** Yiwei Wang, Jie Gao (IHEP, Beijing), Philip Bambade (LAL, Orsay) - The purpose of the final focus (FF) system of the future linear

collider (ILC and CLIC) is to demagnify the beam to the required size at the IP. This can be done in a compact way based on a local chromaticity correction. Two important issues are beam-beam induced radiation effects and the optical correction strategy to mitigate static and dynamic imperfections. For a small enough beam energy spread, we investigate the possibility to get a smaller vertical beam size, at the expense of a larger horizontal beam size, by re-optimising the final focus optics with chromatic correction mainly in the vertical plane. Firstly, we track the beam with MAD-X, with and without chromaticity correction, to estimate the optimum betax and betay values by rematching the linear optics, and cross-check and improve the rematching procedure with MAPCLASS. Then, we study the original design and an alternative simplified optical system, using a set of enlarged betax values, and optimize the sextupoles as a function of betay to minimize the vertical beam size for different assumptions on the energy spread.

The France China Particle Physics Laboratory (FCPPL) and The National Natural Science Foundation of China (NSFC, Project 11175192)

Student Poster Panel SUPWO005

ID: 2023 - TUPWO023 ***Study on Slow Parasitic Extraction of Exceedingly Weak Beam in a High-intensity Rapid Cycling Proton Synchrotron*****, Cai Meng (IHEP, Beijing),** Ye Zou (primary author), Cai Meng, Jingyu Tang (IHEP, Beijing) - This paper proposes a new method to extract extremely weak beam from a high-intensity proton rapid cycling synchrotron in the parasitic mode, while maintaining the normal fast extraction. The usual slow extraction from a synchrotron by third-order resonance method cannot be applied in a RCS due to very short flat-top at the extraction energy. This is even more difficult when it is high-intensity synchrotron due to the strict control on beam loss. The parasitic slow extraction method to extract extremely weak beam from the RCS of CSNS has been studied in details. By moving only beam halo to a scatting foil in the arc region by a local orbit bump in about 2 ms before the fast extraction, one can extract a very small part of the scattered particles with very limited beam loss in the process. At 1.6 GeV and 62.5 A in beam power, halo particles of about 10^{-4} total particles are involved in the parasitic slow extraction can result in a beam intensity of 2105 protons per cycle or lower. Detailed studies including scattering effect in the foil, orbit bumps by bump magnets and energy displacement by adjusting RF, and multi-particle simulations by ORBIT and TURTLE codes are presented.

Student Poster Penal SUPWO006

ID: 2151 - WEPEA010 ***Modeling Longitudinal Bunched Beam Dynamics in Hadron Synchrotrons using Scaled Fourier-Hermite Expansions*****, Kerstin Gross (TU Darmstadt, RTR, Darmstadt)**, Kerstin Gross, Dieter Etienne Mia Lens (TU Darmstadt, RTR, Darmstadt) - To devise control strategies and to analyze the stability of systems with feedback, a set of few ODEs describing the underlying dynamics is required. Numerical Fourier-Hermite solutions of the Vlasov equation have been studied for over fifty years. The idea to expand the distribution function in Fourier series in space and Hermite functions in velocity is transferred to the dynamics of bunched beams in hadron synchrotrons in this contribution. The Hermite basis is a natural choice for plasmas with Maxwellian velocity profile as well as for particle beams with Gaussian momentum spread. The Fourier basis used for spatially nearly uniform plasmas has to be adapted to bunched beams where the beam profile is not uniform in phase. This is achieved analogously to the deduction of the three term recursion relations to construct orthogonal polynomials, but applied to Fourier series with the weight function taken from the Hamiltonian. The resulting system of ODEs for the expansion coefficients of desired order - dependent on the number of functions retained - is checked against macro particle tracking simulations.

Student Poster Panel SUPWO007
ID: 2720 - WEPEA055 ***Quantitative Evaluation of Trapping and Overall Efficiency for Simple Models in One-degree of Freedom*****, Cédric Hernalsteens (CERN, Geneva),** Cédric Hernalsteens, Christopher Frye, Massimo Giovannozzi (CERN, Geneva), Armando Bazzani (Bologna University, Bologna) - A key ingredient for the Multi-Turn Extraction at the CERN Proton Synchrotron is the beam trapping in stable islands of transverse phase space. The control of the trapping process is essential for the quality of the final beam in terms of intensity sharing and emittance. In this paper, a method allowing an analytical estimation of the fraction of beam trapped into stable islands as a function of the Hamiltonian parameters is presented for a very simple model of the dynamics (pendulum) and is extended to the case of the interpolating Hamiltonian of the Hénon model, the latter being a good 2D model of the MTE dynamics. The analytical results are compared with numerical simulations. Additional numerical simulations are presented for the minimum trapping amplitude and a fitted model is proposed. Results are discussed in detail.

Student Poster Panel SUPWO008
ID: 2530 - WEPEA070 ***Space Charge Studies in the CERN Proton Synchrotron*****, Raymond Wasef (CERN, Geneva),** Raymond Wasef, Gianluigi Arduini, Heiko Damerau, Simone Silvano Gilardoni, Steven Hancock, Cédric Hernalsteens, Alexander Huschauer, Frank Schmidt (CERN, Geneva), Giuliano Franchetti (GSI, Darmstadt), Alexander Yu. Molodozhentsev (KEK, Ibaraki) - Space charge produces a large incoherent tune-spread which, in presence of betatronic resonances, could lead to beam losses and emittance growth. In the CERN Proton Synchrotron, at the current injection kinetic energy (1.4 GeV) and even at the future kinetic energy (2 GeV), space charge is one of the main limitations for high brightness beams and especially for the future High-Luminosity LHC beams. Several detailed studies and measurements have been carried out to improve the understanding of space charge limitations to determine the maximum acceptable tune spread and identify the most important resonances causing losses and emittance growth.

Student Poster Panel SUPWO009
ID: 2063 - TUODB102 ***Intra-beam Scattering Study for Low Emittance of BAPS*****, Saike Tian (IHEP, Beijing),** Saike Tian, Yi Jiao, Jiuqing Wang, Gang Xu (IHEP, Beijing) - In modern storage ring light sources, intra-beam scattering (IBS) is often thought of as a fundamental limitation to achieving ultra-low emittance and hence higher brightness. Beijing Advanced Photon Source (BAPS) is under design at Institute of High Energy Physics (IHEP) which aims to emittance less than 1nm at 5GeV. To improve the coherence and high brightness, low emittance- in both transverse planes at the diffraction limit for the range of x-ray wavelengths(≈10 pm)- is being pursued. Thus, due to the very low emittance, intra-beam scattering effect is an issue. Accurate estimation to check if the design goal can be reached is necessary. In this paper, we use the 6-D accelerator simulation code-elegant and Accelerator Toolbox (AT)-a collection of tools to model storage rings in the MATLAB environment. Based on a temporary design lattice of BAPS, we present the results of particle simulation study of intra-beam scattering effect versus the beam energy, the emittance coupling factor, the bunch length, the bunch current and so on. We also studied the mitigating method by adopting damping wigglers in one or more dispersion-free regions.

Student Poster Panel SUPWO010
ID: 2719 - TUPWA022 ***Beam Dynamics Design of a 325MHz RFQ and its Pre-buncher System*****, Fangjian Jia (PKU/IHIP, Beijing),** Fangjian Jia, Jia-er Chen, Ge Liu, Yuanrong Lu, Xueqing Yan (PKU/IHIP, Beijing), Jinhai Li (CIAE, Beijing) - The beam dynamic design of a 325 MHz Radio Frequency Quadrupole (RFQ)

is presented in this paper. This 4-vane RFQ will accelerate pulsed proton beam from 30keV to 3MeV with repetition frequency of 1MHz. A 1 MHz chopper and a 5MHz buncher are arranged in the Low-Energy-Beam-Transport (LEBT) to produce the injected beam. The beam length at the RFQ entrance is about 1ns, and the energy-spread is about 20%. The code of PARMTEQM is used to simulate RFQ structure while the PARMILA is used for the LEBT design. The design should realize high transmission for very high intensity beam meanwhile low emittance growth and relatively shorter length should be kept.

Student Poster Panel SUPWO011
ID: 2932 - TUPWA018 ***Local Compensation-rematch for Major Element Failures in the C-ADS Accelerator*****, Biao Sun (IHEP, Beijing),** Biao Sun, Zhihui Li, Jingyu Tang, Fang Yan (IHEP, Beijing) - In order to achieve the required reliability and availability for the C-ADS accelerator, a fault tolerance design is pursued. The effects of cavity failure in different locations have been studied and the schemes of compensation by means of local compensation have been investigated. After one cavity failure, by adjusting the settings of the neighbouring cavities and the focusing elements we can make sure that the Twiss parameters and energy are approximately recovered to that of the nominal ones at the matching point. The rematch work of the solenoid compensation is proved to be the hardest one in the low energy section, with the new method that the cavity is considered, we change its synchronous phase from negative to the positive one and find the emittance can be controlled well. However, the compensation with the TraceWin code doesn't consider the phase change during the cavity resetting. A code based on MATLAB is under developing to compensate the arrival time at the matching point, and shows its effectiveness.

Student Poster Panel SUPWO012
ID: 2187 - TUPWA023 ***Design of the Tuning System for the He+ Coupled RFQ-SFRFQ Cavity*****, Wenlong Xia (PKU/IHIP, Beijing),** Wenlong Xia, Jia-er Chen, Shu Li Gao, Yuanrong Lu, Shi Xiang Peng, Zhi Wang, Xueqing Yan, Kun Zhu (PKU/IHIP, Beijing) - A new type linac CRS (coupled RFQ-SFRFQ cavity), which coupled traditional RFQ (radio frequency quadrupole) and SFRFQ (separated function RFQ) electrodes into a single cavity, is completed the overall design and being manufactured currently. In this paper, we aimed to design a frequency tuning system for the CRS cavity and explored the electromagnetic field distribution between RFQ and SFRFQ sections in the single cavity. The frequency range, variation of Q value, power consumption and electric field distribution were investigated. Based on the beam dynamic program (PARMTEQM and SFRFQDYNv1.0), we analyzed the beam transmission properties of the cavity under the unbalanced electric field distribution. The optimized parameters of the tuning system were obtained.
Supported by NSFC 10905003, 11079001, 91026012 Corresponding author: wangzhi@pku.edu.cn

Student Poster Panel SUPWO013
ID: 2314 - TUPWA020 ***The Implementation of Equipartitioning in the Proton Linac Code PADSC*****, Yaliang Zhao (IHEP, Beijing),** Yaliang Zhao, Shinian Fu, Zhihui Li (IHEP, Beijing) - Padsc is a proton linac code which does Linac dynamic design, tracking and optimization. The code is compiled in Linux C++, and the time is the independent variable. The main useage is high intensity accelerator where exact calculation of nonlinear space charge force is very important. The code computes the 3D space charge with PIC method and FFT serves as the solver of Poisson equation. Padsc tracks the beam with matrix method and multiparticle method. The equipartitioning optimization is one of the most significant feature. Nowadays, the ordinary

equipartitioning is done under a lot of assumptions, such as the constant emittance and space charge. Padsc is going to do equipartitioning according to the real machine parameters and beam emittance.

Student Poster Panel SUPWO014
ID: 2349 - THOBB102 ***Beam Coupling Impedance Localization Technique Validation and Measurements in the CERN Machines*****, Nicolo Biancacci (CERN, Geneva),** Nicolo Biancacci, Gianluigi Arduini, Theodoros Argyropoulos, Hannes Bartosik, Rama Calaga, Karel Cornelis, Simone Silvano Gilardoni, Elias Métral, Nicolas Mounet, Yannis Papaphilippou, Giovanni Rumolo, Benoit Salvant, Guido Sterbini, Rogelio Tomas, Raymond Wasef (CERN, Geneva), Mauro Migliorati, Luigi Palumbo (URLS, Rome) - The beam coupling impedance leads to limitations in beam brightness and needs accurate quantification and continuous monitoring in order to detect and mitigate high impedance sources. In the CERN machines, for example, kickers and collimators are expected to be the main contributors to the total imaginary part of the machine impedance. In order to detect the other sources, a beam based measurement was developed: from the variation of phase beating with intensity, it is possible to detect the main impedance locations. In this work we present the validation of the method done varying the current in a pair of quadrupoles in the CERN PS, and the measurements with beam done in the CERN PS and other CERN machines.

Student Poster Panel SUPWO015
ID: 3266 - TUPWA021 ***Study on the Multi-pass, Multi-bunch Beam Breakup for 9-cell TESLA Cavities in ERL*****, Si Chen (PKU/IHIP, Beijing)**, Si Chen, Jia-er Chen, Liwen Feng, Senlin Huang, Yongming Li, Kexin Liu, Shengwen Quan, Feng Zhu (PKU/IHIP, Beijing) - It is well known that multi-pass, multi-bunch beam breakup (BBU) due to the HOMs in superconducting cavity is the main limitation to the beam current in ERLs. In general, cavities with stronger HOM damping are needed in most high current ERL facilities. However, for some compact ERLs which work at relatively low beam current and energy, it might be sufficient to use the 9-cell Tesla-type cavities in those ERLs. In this paper, the BBU threshold currents for compact ERL test facilities with 9-cell Tesla cavities are simulated by different BBU codes and the feasibility of using 9-cell Tesla cavity in those compact ERL test facilities with low current and low energy is discussed.
Supported by the Major State Basic Research Development Program of China under Grant No. 2011CB808303 and No. 2011CB808304

Student Poster Panel SUPWO016
ID: 2209 - TUPWA013 ***Monopole Modes Studies of the C-ADS Elliptical Cavities*****, Peng Cheng (IHEP, Beijing),** Peng Cheng, Zhihui Li, Jingyu Tang, Jiuqing Wang (IHEP, Beijing) - The C-ADS accelerator is a CW proton linac which accelerates the beam to 1.5GeV. It has the characteristics of being very high beam power and very high reliability that are not posed by any of the existing proton linacs. The accelerator uses two families (β=0.63 and β=0.82) of elliptical five cell superconducting cavities. High Order Modes can severely limit the operation of these cavities. Monopole modes are found by Microwave Studio CST. Then the longitudinal instability caused by these monopole modes are primarily investigated with code bbusim, taking into account of effects like High Order Modes frequency spread, beam input jitters and other beam and RF parameters of the beams and cavities. Preliminary simulation results show that monopole modes induced instability is not a problem if High Order Modes frequency spread is not less than 1MHz. However, further investigations are necessary in order to make a critical decision such as whether HOM damper will be adopted. Study on the transverse case is under way.

Student Poster Panel SUPWO017
ID: 3166 - TUPWA058 ***Experimental Study of Soliton Wave Trains in Electron Beams*****, Yichao Mo (UMD, College Park, Maryland),** Yichao Mo, Joseph Louis-Brian Beaudoin, Donald Feldman, Irving Haber, Rami Alfred Kishek, Patrick Gerard O'Shea (UMD, College Park, Maryland) - Longitudinal perturbations in intense beams can lead to instabilities or degradation of beam quality, ultimately affecting the performance of accelerators, especially near the source where space charge is important. In this experimental study, conducted on the University of Maryland Electron Ring (UMER), large-amplitude perturbations are purposefully generated and their propagation observed over a long transport length. It is found that narrow, large-amplitude perturbations on a long-pulse beam develop into Korteweg-deVries (KdV) type soliton wave trains. Each peak in the wave train has a constant width and amplitude over a long propagation distance, with the amplitude inversely proportional to the square of the width. Furthermore, two such pulses are seen to interact with each other and emerge from the collision unchanged. The experimental data is compared with the KdV model and particle-in-cell simulations with good agreement. We induce perturbations using two methods: using photoemission to perturb the density at the cathode, or using an induction cell to directly perturb particle velocities.
Supported by the US Dept. of Energy, Office of High Energy Physics, and by the US Dept. of Defense, Office of Naval Research and the Joint Technology Office.

Student Poster Panel SUPWO018
ID: 2442 - MOPWO088 ***Semi-analytical Description of the Modulator Section of the Coherent Electron Cooling via Integral Transforms*****, Andrey Elizarov (BNL, Upton, Long Island, New York),** Andrey Elizarov, Vladimir N. Litvinenko (BNL, Upton, Long Island, New York) - Here we discuss the theoretical description of the modulator section of the coherent electron cooling (CeC) device*, the modern realization of the stochastic electron cooling idea. The electron beam records the information about the hadron beam via electron density perturbations resulting from the shielding of the hadrons. To analyze the performance of the CeC shielding of a hadron should be computed with high precision. Here we propose a solution of this problem via Fourier and Laplace transforms for 1D, 2D and 3D plasmas. In some cases there are fully analytical solutions, which gave an opportunity to test semi-analytical ones involving numerical evaluations of the inverse integral transforms. Having its own practical value this solution will also serve as a testing ground for our general solution via numerical treatment of the integral equations applicable for the realistic case of the finite beam**.
* V. N. Litvinenko, Y. S. Derbenev, Phys. Rev. Lett. 102, 114801 (2009).
** A. Elizarov, V. Litvinenko, G. Wang, IPAC'12 Proceedings, weppr099 (2012).
Work supported by Brookhaven Science Associates, LLC under Contract No. DE-AC02-98CH10886 with the U.S. Department of Energy.

Student Poster Panel SUPWO019
ID: 2971 - MOPWO006 ***Eigenmode Computation for the GSI SIS18 Ferrite Cavity*****, Klaus Klopfer (TEMF, TU Darmstadt, Darmstadt),** Klaus Klopfer, Wolfgang Ackermann, Thomas Weiland (TEMF, TU Darmstadt, Darmstadt) - At the GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt the heavy-ion synchrotron SIS18 is operated to further accelerate stable nuclei of elements with different atomic numbers. Two ferrite-loaded cavity resonators are installed within this ring. During the acceleration phase their resonance frequency has to be adjusted to the revolution frequency of the heavy-ions to reflect their increasing speed. To this end, dedicated biased ferrite-ring cores are installed inside the cavities for a broad frequency tuning. By properly choosing a suited bias current, the

differential permeability of the ferrite material is modified, which finally enables to adjust the eigenfrequency of the resonator system. Consequently, the actual resonance frequency strongly depends on the magnetic properties of the ferrites. The goal of the current study is to numerically determine the lowest eigensolutions of the GSI SIS18 ferrite-loaded cavity. For this purpose, a new solver based on the Finite Integration Technique has been developed.
Supported by GSI

Student Poster Panel SUPWO020
ID: 3148 - MOPWO020 ***Space Charge Dominated Envelope Dynamics using GPUs*****, Natalia Kulabukhova (St. Petersburg State University, St. Petersburg),** Natalia Kulabukhova (St. Petersburg State University, St. Petersburg) - High power accelerator facilities lead to necessity to consider space charge forces. It is therefore important to study the space charge dynamics in the corresponding channels. To represent the space charge forces of the beam we have developed special software based on some analytical models for space charge distributions. Because calculations for space charge dynamics become extremely time consuming, we use a special algorithm for predictor-corrector method for evaluation scheme for beam map evaluation including the space charge forces. This method allows us to evaluate the map along the references trajectory and to create the beam envelope dynamics. The corresponding computer codes are realized using CUDA implementation of maps for particle dynamics. Some numerical results for different types of the beam channels are discussed. The survey of advantages and disadvantages of using different methods of parallelization and some parallel approaches will be done.

Student Poster Panel SUPWO021
ID: 2430 - MOPWO001 ***Moment Method Beam Dynamics Code Development: Extended for Radio Frequency Quadrupole Simulations*****, Toon Roggen (KU Leuven, Kortrijk),** Toon Roggen, Herbert De Gersem, Bert Masschaele (KU Leuven, Kortrijk), Wolfgang Ackermann, Sylvain Sebastian Franke, Thomas Weiland (TEMF, TU Darmstadt, Darmstadt) - A Radio Frequency Quadrupole (RFQ) enables acceleration of a continuous low-velocity hadron beam, combining velocity independent electric focusing and adiabatic bunching, resulting in high-current compact bunches with nearly 100% capture and transmission efficiency. With virtually no post-construction tuning capabilities, an RFQ design phase requires all transient parameters (machining tolerances, thermo-mechanical deformation factors). This allows the determination of acceptable tolerances on input and output beam characteristics, of major importance in beam availability and beam trip prevention, and makes fast beam dynamics simulation codes incorporating RFQs indispensable. This article presents the implementation and validation of an RFQ beam line element into V-Code, a moment method beam dynamics simulation code. V-Code time integrates the Vlasov equation for an initial particle distribution represented by a discrete set of characteristic moments, accounting for all exerting internal and external forces. V-Code delivers highly accurate beam dynamics results with precision and efficiency advantages in terms of average or rms beam dimensions, projected emittances or total energy.
This research is funded by grant “KUL 3E100118” “Electromagnetic Field Simulation for Future Particle Accelerators”, project FP7-Euratom No. 269565 and the Belgian Nuclear Research Centre (SCKCEN).

Student Poster Panel SUPWO022

ID: 3181 - MOPWO073 ***Design and Simulation of an Extraction Section for the University of Maryland Electron Ring*****, Kiersten J Ruisard (UMD, College Park, Maryland),** Kiersten J Ruisard, Santiago Bernal, Irving Haber, Rami Alfred Kishek, Timothy Koeth (UMD, College Park, Maryland) - The University of Maryland Electron Ring (UMER) is a low-energy scaled facility for the study of intense beam dynamics, relevant to higher energy, high intensity accelerators. Many parameters crucial to understanding space charge dominated beam evolution, such as transverse emittance and longitudinal temperature, require the use of turn-by-turn interceptive diagnostics. To meet this need, we plan to implement an extraction section with a fast-pulsed electric-field kicker. This paper presents a suite of simulations used to guide the design process and predict extraction performance, using the WARP Particle-in-cell (PIC) code. Simulations in a transverse slice geometry predict beam trajectory and monitor beam evolution through extraction, taking advantage of the unique bent coordinate system at the heart of the WARP code. WARP simulations are compared with experimental results, by replicating a beam profile imaging experiment with electrodes similar to the proposed extraction kicker. Finally, we show WARP-based predictions for the effect of magnetic lattice perturbations introduced by extraction on the recirculating beam.

Supported by the US Dept. of Energy, Office of High Energy Physics, and by the US Dept. of Defense, Office of Naval Research and the Joint Technology Office.

Main Classification 6 Instrumentation, Controls, Feedback and Operational Aspects

Student Poster Panel SUPWO023
ID: 3002 - MOPME071 ***Characterisation of Si Detectors for use at 2 Kelvin*****, Marcin Ryszard Bartosik (CERN, Geneva),** Marcin Ryszard Bartosik, Bernd Dehning, Christoph Kurfuerst, Mariusz Sapinski (CERN, Geneva) - It is expected that the luminosity of the Large Hadron Collider (LHC) will, in the future, be limited by the beam loss limits of the superconducting magnets. To protect the superconducting magnets of the high luminosity insertions an optimal detection of the energy deposition by the shower of beam particles is necessary. Beam Loss Monitors (BLM) therefore need to be placed close to the particle impact location in the cold mass of the magnets were they need to operate in Superfluid Helium at 1.9 Kelvin. To choose optimal detector material the characteristics of n-bulk type silicon detectors have been examined at superfluid liquid helium temperature whilst under irradiation from a high intensity proton beam. The Si detector radiation hardness and leakage current were found to be drastically improved at 2K when compared to its operation at room temperature. This unexpected result will be discussed in detail.

Student Poster Panel SUPWO024
ID: 2134 - MOPME038 ***A Theoretical Design of Beam Loss Monitoring System for HLS II*****, Yukai Chen (USTC/NSRL, Hefei, Anhui),** Yukai Chen (USTC/NSRL, Hefei, Anhui) - The beam loss monitoring(BLM) system has been commonly used to detect vacuum leakage. But the functions of BLM system can be further developed. The existing BLM system at Hefei Light Source (HLS) was built in 2000. By using a new way of detectors installation, it can not only detect the vacuum leakage of the storage ring, but also obtain informations about Touschek lifetime. Recently, the HLS is being upgraded to HLS II. The magnet lattice of HLS II will be changed from TBA to DBA. Its Touschek lifetime will be much shorter than before, and it will dominate the total beam lifetime. These changes will bring some new problems, which impels us to improve the BLM system to adapt to the new situation. That means the BLM system for HLS II must be redesigned. Besides maintaining the general functions of BLM system, developing a method to monitor Touschek lifetime with BLM system is the most important part of this work. According to the results of our research, a preliminary theoretical design for the new BLM system has been proposed in this paper. This new system will play an important role in the storage ring commissioning,troubleshooting, and the beam lifetime studying.

Student Poster Panel SUPWO025
ID: 1982 - MOPME039 ***A New Method of Acquiring Fast Beam Transversal Profile in the Storage Ring*****, Chaocai Cheng (USTC/NSRL, Hefei, Anhui),** Chaocai Cheng, Ping Lu, Bao-gen Sun, Kai Tang, Fangfang Wu, Yunyun Xiao, Yongliang Yang, Ze Ran Zhou, Junying Zou (USTC/NSRL, Hefei, Anhui) - A new method of acquiring fast beam transversal profile has been developed and will be used in HLS II. This method is based on four signals from MAPMT (multi-anode photo-multiplier tube) and logarithm processing technique. First, the calculation formula of beam transversal size and position are deduced using above method. Then, the main performances (e.g. sensitivity and linearity range) are analyzed. According to stimulation result, regardless of cross-talk and inconsistency between channels, the size signal has a linear relation with size s when s=0.8~2mm and position d=±2mm, the position signal has a linear relation with position d and the linear range exceeds ±2mm when s=0.6~2mm. With channel cross-talk and channel inconsistency being considered, the

stimulation results also are given. Finally, a fast beam transversal profile monitor is designed and provides turn-by-turn measurement of the beam transversal profile.

Student Poster Panel SUPWO026
ID: 2263 - MOPWA059 ***Beam Emittance Measurements and Beam Transport Optimization at the Clatterbridge Cancer Centre*****, Tomasz Cybulski (Cockcroft Institute, Warrington, Cheshire),** Tomasz Cybulski (Cockcroft Institute, Warrington, Cheshire), Oleg Karamyshev, Carsten Peter Welsch (Cockcroft Institute, Warrington, Cheshire; The University of Liverpool, Liverpool), Alberto Degiovanni (TERA, Novara) - The QUASAR Group is preparing tests of the high energy physics LHCb VELO detector as a non–invasive online dose monitor at the 60 MeV proton therapy beam at the Clatterbridge Cancer Centre (CCC), UK. The proposed method relies on the cross-correlation between the beam halo signal as measured by VELO and the dose delivered to the patient, linked via the absolute intensity of the beam. In order to estimate the expected halo signal and the total beam intensity, studies into proton beam transport through the whole CCC beam line have been carried out. This required the measurement of beam emittance at several positions of the beam delivery system. Quadrupole scans have been realized using a CsI (Tl) scintillating screen in combination with an 8 bit, 13 Mpixel CCD camera. In this contribution, results from measurements are presented and include a discussion of the effects from dispersion in the beam. Experimental data are compared against earlier measurements performed in 1998 and are used as a basis for suggestions targeting an overall optimization of beam transport at CCC.
* Assessing the Suitability of a Medical Cyclotron as an Injector for an Energy Upgrade, J. A. Clarke et all , CLRC Daresbury Laboratory, Warrington, UK

Student Poster Panel SUPWO027
ID: 2686 - MOPWA061 ***A New Tool for Longitudinal Tomography in Fermilab's Main Injector and Recycler Rings*****, Nicholas John Evans (The University of Texas at Austin, Austin, Texas),** Nicholas John Evans, Sacha Elmer Kopp (The University of Texas at Austin, Austin, Texas), Philip Adamson, Duncan Scott (Fermilab, Batavia) - We are developing software to compute tomographic reconstructions of longitudinal phase space distributions in the Fermi National Accelerator Laboratory Main Injector and Recycler rings using data from existing resistive wall current monitors to diagnose beam quality at injection and provide input distributions for simulation of losses. Building on the algorithm developed by *S. Hancock et al. at CERN the software is able to process a full synchrotron period of a Booster batch of 81 bunches with 18.94 ns spacing and a sampling rate of 2.5 GHz, in < 30 sec, or every ~270 injections. Processing an entire injection opens up the possibility of investigating coupled bunch instabilities via tomography. To speed reconstruction for use on a full injection, phase space maps are created once for a given set of parameters and saved for injections with similar machine settings. We present an overview of the system and studies done on the effect of small errors present including: random noise, mismatch between sampling rate and machine period, errors in locating bunch centers, and trigger jitter.
*Tomographic Measurements of Longitudinal Phase Space Density; 1998 ed. - Hancock, S et al - CERN-PS-98-030-RF
U.S Department of Energy

Student Poster Panel SUPWO028
ID: 2257 - MOPME068 ***Feasibility Study of a Second Generation Smith-Purcell Radiation Monitor for the ESTB at SLAC*****, Nuria Fuster Martinez (IFIC, Valencia),** Nuria Fuster Martinez, Angeles Faus-Golfe, Javier Resta-López (IFIC, Valencia), Faissal Bakkali Taheri, Riccardo Bartolini, George Doucas, Ivan Vasilyevich Konoplev, Colin Perry, Armin

Reichold, Scott Robert Stevenson (JAI, Oxford), Nicolas Delerue (LAL, Orsay), Heather L. Andrews (LANL, Los Alamos, New Mexico), Vinod Bharadwaj, Christine Isabel Clarke (SLAC, Menlo Park, California) - The use of a radiative process such as the Coherent Smith-Purcell Radiation (CSPR) is a very promising non-invasive technique for the reconstruction of the time profile of relativistic electron bunches. Currently existing CSPR monitors do not have yet single-shot capability. Here we study the feasibility of using a CSPR based monitor for bunch length measurement at the End Station Test Beam (ESTB) at SLAC. The aim is to design a second-generation device with single-shot capability, and use it as a diagnostic tool at ESTB. Simulations of the spectral CSPR energy distribution and feasibility study have been performed for the optimization of the parameters and design of such a device.

Student Poster Panel SUPWO029
ID: 2361 - MOPME020 ***Development of the New Measurement Method for the Incoherent Tune Spread and the Tune Shift Caused by the Space Charge Effect*****, Shinichi Kato (Tohoku University, Sendai),** Shinichi Kato (Tohoku University, Sendai), Hideaki Hotchi, Michikazu Kinsho (JAEA/J-PARC, Tokai-Mura, Naka-Gun, Ibaraki-Ken), Hiroyuki Harada, Kota Okabe (JAEA/J-PARC, Tokai-mura) - For the high intensity accelerator, the incoherent tune which is the frequency of the individual particles is shifted and decreases due to the space charge effect. In addition, the incoherent tune is formed into spread shape commonly. When the incoherent tune satisfies a resonance condition, it might be occurred the beam emittance growth and the beam loss. So it is necessary to reduce the incoherent tune spread and the tune shift as much as possible. To achieve this condition, it is desired to measure the incoherent tune spread and the tune shift directly. Therefore we are developing the new measurement method of the incoherent tune spread and the shift due to the space charge effect. From the simulation results, it was cleared that the beam distribution can be modified in the case of using the mono frequency dipole exciter because a particle which has the tune corresponding to the exciter can be resonated temporary. In addition, it was cleared that it is possible to evaluate the incoherent tune spread and the tune shift by the measurement of the distribution transition. We present the outline of this method and the developing plane at the J-PARC RCS.

Student Poster Panel SUPWO030
ID: 3662 - MOPWA069 ***Time-resolved Electron Beam Position Monitor Macropulse Waveform Measurement in MkV Linear Accelerator at University of Hawaii Free Electron Laser Laboratory*****, Pardis Niknejadi (University of Hawaii, Honolulu, HI),** Pardis Niknejadi, Michael Robert Hadmack, Bryce Jacobson, John Madey, Gary Varner (University of Hawaii, Honolulu, HI) - Real time waveform measurements of electron beams will provide valuable data and possibility of online bunch diagnostics in linear accelerators. The University of Hawaii Linear Accelerator utilizes a thermionic LaB6 cathode microwave gun injector and a single section of S-band linear accelerator capable of producing a 40MeV, 1-2 ps bunched electron beam with average current of 200mA over the duration of a 4.5 us macropulse. This beam, pulsed at 4 Hz, produces strong RF signal at 2.856 GHz which is coupled out of the beam-pipe by a family of stripline beam position monitors (BPM's) and read out using custom built logarithmic-difference based electronics installed in 2012.* A high speed Analog to Digital Convertor and Field-Programmable Gate Array will be used to digitize the signal and record the waveform. The goal is to make a cost effective oscilloscope on a chip/board with feasible and functional operation to achieve optimal beam configuration. The circuit board design, in-circuit programming, waveform digitization challenges, and preliminary results from the prototype will be presented at the conference.

* B. T. Jacobson, M. R. Hadmack, J. M. J. Madey, P. Niknejadi "Modular Logarithmic Amplifier Beam Position Monitor Readout System at University of Hawai'i," IBIC Conf. Proc. (2012)

Student Poster Panel SUPWO031

ID: 3708 - MOPME062 ***UV and X-ray Diffraction Radiation for Submicron Noninvasive Diagnostics,*** **Daria Sergeeva (MEPhI, Moscow),** Daria Sergeeva, Mikhail Nikolaevich Strikhanov, Alexey Alexandrovich Tishchenko (MEPhI, Moscow) - Diffraction radiation (DR) arises when a charged particle moves near a target. The theory of X-ray DR from single particles was created in [*, **], and recently the theory has been developed for bunches [***]. DR from relativistic particles is used for noninvasive bunch diagnostics and also for creating new and effective sources of radiation, including Free-electron laser based on the Smith-Purcell effect. In the present work we explore theoretically DR from the bunch of ultrarelativistic charged particles at X-ray and UV frequencies domains. It is shown that incoherent part of form-factor, describing the effect of N electrons in bunch, exists and differs from the unity. The coherent part of radiation depends on transversal size of the bunch as ratio of the Bessel function to its argument. The coherence effects are proved to be important up to the wavelengths much less than transversal size of the bunch. The results obtained open the possibility to diagnose bunches of the submicron size with very high accuracy.

* A.A. Tishchenko et al, PLA. 359 (2006) 509.
** A.P. Potylitsyn et al, Diffraction radiation from relativistic particles, Springer, 2010
*** D.Yu. Sergeeva et al, Proc. Channeling-2012, p.52, 2012

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Student Poster Panel SUPWO032

ID: 2300 - MOPME067 ***Non-invasive Bunch Length Diagnostics based on Interferometry from Double Diffraction Radiation Target*****, Dmitry Shkitov (TPU, Tomsk),** Dmitry Shkitov, Gennady Naumenko, Alexander Potylitsyn, Mikhail Victorovich Shevelev (TPU, Tomsk), Haixiao Deng, Shanliang Lu, Tiemin Yu, Jianbing Zhang (SINAP, Shanghai) - Reliable and precise non-invasive beam diagnostics technique to measure length of sub-picosecond electron bunches are required for new accelerator facilities (FEL, et al.). Investigations of coherent radiation generated by such bunches using different interferometers allow to determine a bunch length*. Measuring a dependence of radiation yield intensity from two DR targets on a distance between them (the intrinsic DR interferogram), it is possible to obtain the same information. Such a non-invasive technique can be directly used for ultra-short bunch length measurements. Recently the first experiment with a double DR target was carried out at the SINAP fs linac facility** with parameters described in***. The double DR target was consisted of two plates made from Al foil. The pyro-electric detector SPI-D-62 was used. Here we report the results of the second stage of our investigations. The DR interferograms of different electron bunch length were measured. The bunch length was reconstructed using the heuristic model based on the dimension theory and simulation data. We compare the results from DR interferograms and Michelson interferometer measurements and show their similarity.

*Murokh A. et al., NIMA 410 (1998) 452.
**Zhang J.B., Shkitov D.A. et al., IBIC'12 MOPB65 (2012).
***Lin X., Zhang J. et al., Chin. Phys. Let. V. 27 N. 4 (2010) 044101.

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Student Poster Panel SUPWO033
ID: 2404 - MOPME051 ***Development of Cavity Beam Position Monitor System at SINAP*****, Bao Peng Wang (SINAP, Shanghai),** Bao Peng Wang, Yongbin Leng, Luyang Yu, Renxian Yuan (SINAP, Shanghai) - Shanghai soft X-ray free electron laser (SXFEL) facility requires beam position resolution better than 1 μm in the undulator sections. Cavity BPM system, feasible in obtaining sub micron position resolution, has been developed to achieve the goal. Two cavity prototypes with high Q and low Q were designed and fabricated. The relevant dedicated electronic, which could cover the two types of cavity BPMs, also have been developed. Fast fourier transform (FFT) and digital down converted based algorithms were implemented. The beam test of the whole system has been scheduled on the Shanghai deep ultraviolet (SDUV) FEL facility. The cavity design, electronic architecture, achieved performance during beam test will be presented.

Student Poster Panel SUPWO034
ID: 2722 - MOPME036 ***Prototype Experiment Preparation of a 54.167MHz Laser Wire System for FEL-THz Facility at CAEP*****, Dai Wu (TUB, Beijing),** Dai Wu (TUB, Beijing), Wei Bai, Ming Li, Xingfan Yang (CAEP/IAE, Mianyang, Sichuan) - In this paper, a prototype experiment preparation of a 54.167 MHz laser wire system is presented, which will be used to measure the beam size of a CW DC gun built as an electron source of FEL-THz facility in China Academmy of Engineering Physics (CAEP). The rms beam size is less than 1 mm and the average current of the electron beam is more than 1 mA. This new-type LW system ultilizes the excess power other the photocathode drive laser and becomes much cheaper and simpler. Plus, it can distinguish beams with different energies which are very close in ERLs. The system layout and the simulation results are also presented.

Student Poster Panel SUPWO035
ID: 1984 - MOPME041 ***Design and Calculation of the Stripline Beam Position Monitor for HLS II Storage Ring*****, Fangfang Wu (USTC/NSRL, Hefei, Anhui),** Fangfang Wu, Chaocai Cheng, Wubin Li, Ping Lu, Tianji Ma, Bao-gen Sun, Hong-liang Xu, Yongliang Yang, Ze Ran Zhou (USTC/NSRL, Hefei, Anhui) - According to the requirements of HLS II upgraded, in order to acquire the non-intercepting measurement of beam position and quadrupole component, we design a new stripline beam position monitor (BPM) for storage ring. We optimize the BPM parameters to acquire impedence matching with characteristic impedance of the external transmission lines, the coupling coefficients between the electrodes are calculated using CST microwave studio program. According to the difference/sum and log-ratio methods, we get the horizontal and vertical sensitivities, mapping figures and fitting polynomials. The results show that sensitivities and linear range using log-ratio method are bigger than those using difference/sum method. We also simulate the sum signal when beam displacement varies from (0mm,0mm) to (5mm,5mm), the result shows that the variety of normalized sum signal is no more than ±6%.
Supported by the National Science Foundation of China (10875117, 11005105, 11175173)

Student Poster Panel SUPWO036
ID: 2310 - MOPME042 ***A Preliminary Simulation of High Sensitivity BPM Signal Detection Front-end for HLS II*****, Jiajun Zheng (USTC/NSRL, Hefei, Anhui),** Jiajun Zheng, Ping Lu, Bao-gen Sun, Yongliang Yang, Junying Zou (USTC/NSRL, Hefei, Anhui) - A high sensitivity BPM signal detection front-end have been designed for HLS II tune measurement system according to the design specification of HLS II upgrade. Classical tune measurement systems filter out just one or a few of these betatron sidebands. As a consequence, most of the betatron energy is lost and only a very small fraction remains for further

processing. A new method, referred to as Direct Diode Detection (3D) by LHC, overcomes this and a few other problems. In this paper, a preliminary simulation is performed to test and verify the feasibility of high sensitivity BPM signal detection front-end electronics by 3D for HLS II. The simuation results clearly show that the technique of 3D can be applied to HLS tune measurement system.
Supported by National Natural Science Foundation of China (11105141, 11175173) and the Fundamental Research Funds for the Central Universities (WK2310000015)

Student Poster Panel SUPWO037
ID: 2506 - THPEA032 ***Software for Power Supplies Control of the NSLS-II Booster Synchrotron*****, Pavel Borisovich Cheblakov (BINP SB RAS, Novosibirsk),** Pavel Borisovich Cheblakov, Anton Anatolievich Derbenev, Sergey Evgenyevich Karnaev, Stanislav S. Serednyakov (BINP SB RAS, Novosibirsk), Yuke Tian (BNL, Upton, Long Island, New York) - The booster synchrotron of the NSLS-II light source at Brookhaven National Laboratory (BNL) provides electron beam acceleration from 200 MeV up to 3 GeV in 300 ms. This imposes strict conditions on both accuracy of control and synchronization of ramping Power Supplies (PS). Hardware part of PS controls are based on electronics specially developed at BNL and includes Power Supply Controllers (PSC) and Power Supply Interfaces (PSI). The former represents digital part of hardware and implements low-level logic (generating ramp functions, simple data verification and data acquisition), communication with control system software and PSI. The latter is an analogue part of entire system and it performs generation and acquisition analogue and digital signals by a set of on-board DACs, ADCs and digital inputs/outputs. The PSC and the PSI are connected by digital fibre optic link for electrical decoupling. This paper describes software for the booster synchrotron PSs control which is based on EPICS and includes a specially designed electronics configuration, a set of programs to manage ramp functions and to control different types of power supplies, both pulsed and ramping.

Student Poster Panel SUPWO038
ID: 1963 - THPEA033 ***Electronics for Precise Measurements of Accelerator Pulsed Magnets*****, Anton Vladimirovich Pavlenko (BINP SB RAS, Novosibirsk),** Anton Vladimirovich Pavlenko, Alexander M. Batrakov, Igor Ilyin (BINP SB RAS, Novosibirsk) - Injection and extraction systems of modern accelerator complexes have high requirements for measurements accuracy of pulsed magnets field parameters. To satisfy these demands the fast and precision digital integrator was elaborated in BINP, Russia. This device is intended for measurements in pulse magnets (septum magnets, bumps, etc.) with the field duration, ranging from 5 μs, providing a relative accuracy better than 5e-5. Modern digital technique is used to get the partial integral of the signal, issued by induction sensor, in the strongly determined time interval. The first part of the paper considers principles and theoretical aspects of the digital integration technique. The structure of the digital integrator VsDC3 is presented and key features are listed. In the second part of the report the examples of integrator applications are presented. The set of these devices is the main measuring electronics in injection and extraction section of 3 GeV Booster Ring at NSLS-II facility, which is under construction now in BNL (USA). The structure of the system for measurements of Booster pulsed magnets, first results of its commissioning and testing are reported.

Student Poster Panel SUPWO039
ID: 3530 - THPEA030 ***Improved Vector Modulator Card for MTCA-based LLRF Control System for Linear Accelerators*****, Igor Rutkowski (Warsaw University of Technology, Warsaw),** Igor Rutkowski, Krzysztof Czuba, Maciej Grzegrzółka (Warsaw University of Technology, Warsaw), Holger

Schlarb (DESY, Hamburg), Dariusz Radoslaw Makowski, Aleksander Mielczarek, Piotr Perek (TUL-DMCS, Lodz) - Modern linear accelerators require high-precision RF field regulation of accelerating cavities. A critical component to achieve high-precision in the feedback loop a Low Level Radio Frequency (LLRF) controller is the vector modulator driving the high power RF chain. At FLASH, the Free Electron Laser in Hamburg and European XFEL the LLRF controls are based on MTCA.4 platform. This paper describes the concept, design and performance of an improved vector modulator module (DRTM-VM2). It is constructed as Rear Transition Module (RTM). The module consists of digital, analog, diagnostic and management subsystems. FPGA from Xilinx Spartan 6 family receives data from control module (AMC) using Multi-Gigabit Transceivers (MGTs). The FPGA controls the analog part which includes fast, high-precision DACs, I/Q modulator chips, programmable attenuators, power amplifier and fast RF gates for external interlock system. Pin assignment on the Zone3 connector is compliant with digital class D1.2 recommendations proposed by DESY. The design has been optimized for mass production and for easy extends to wider frequency range. Electronic switches offer software configuration of power and clock sources.

Student Poster Panel SUPWO040

ID: 2928 - THPEA055 ***NESTOR Facility Control System*****, Dmytro Tarasov (NSC/KIPT, Kharkov),** Dmytro Vyacheslavovych Tarasov (NSC/KIPT, Kharkov) - The general principles of the NESTOR facility control system are presented in the paper. The main features of the systems such as magnetic, vacuum, diagnostic, Rf etc. concerning the control and monitoring are discussed. The first results of the system implementation are presented.

Student Poster Panel SUPWO041

ID: 2217 - WEPME053 ***Latest Performance Results from the FONT 5 Intra Train Beam Position Feedback System at ATF*****, Michael Roger Davis (JAI, Oxford),** Michael Roger Davis, Douglas Robert Bett, Neven Blaskovic Kraljevic, Philip Burrows, Glenn Brian Christian, YoungIm Kim, Colin Perry (JAI, Oxford), Robert Apsimon, Ben Constance, Alexander Gerbershagen (CERN, Geneva) - A prototype ultra-fast beam-based feedback system for deployment in single-pass beamlines, such as a future lepton collider (ILC or CLIC) or a free-electron laser, has been fabricated and is being tested in the extraction and final focus lines of the Accelerator Test Facility (ATF) at KEK. FONT5 is an intra-train feedback system for stabilising the beam orbit via different methods: a position and angle feedback correction in the extraction line or a vertical feedforward correction applied at the interaction point (IP) . Two systems comprise three stripline beam position monitors (BPMs) and two stripline kickers in the extraction line, two cavity BPMs and a stripline kicker at the IP, a custom FPGA-based digital processing board, custom kicker-drive amplifiers and low-latency analogue front-end BPM processors. Latest results from the experiment are presented. These include beam position correction at the sub-micron level in the extraction line, as well as preliminary results of beam correction at the IP.

Student Poster Panel SUPWO042

ID: 2297 - ***WEPME025 The Surveying Data Processing of Control Network based on NSRL Upgrade*****, Wei Wang (USTC/NSRL, Hefei, Anhui),** Xiaoye He, Peng Wang, Wei Wang, Shaofeng Xu, Qiuyang Yao (USTC/NSRL, Hefei, Anhui) - During the course of the data processing of control network based on the NSRL upgrade program, using the Spatial Analyzer (SA) graphical 3D metrology software adjusts the data of surveying. In order to check the correctness of the adjustment result, a three dimensional adjustment made by the software MAA developed by IHEP and a plane

adjustment made by SURVEY adds a vertical adjustment by NASEW2003. Through comparing the results adjusted by different softwares, demonstrates the result adjusted by SA is reliable. At last, this paper attempts to analyze the effect to result of data processing because of using different adjustment ways.

Student Poster Panel SUPWO043
ID: 2087 - WEPME023 ***Study of the Vibration of the AC Dipole and Magnetic Measurement Girder for CSNS/RCS*****, Renhong Liu (IHEP, Beijing),** Renhong Liu, Ling Kang, Huamin Qu, Guangyuan Wang, Haijing Wang, Jun Song Zhang (IHEP, Beijing) - The dipole magnet of the China Spallation Neutron Source Rapid-cycling Synchrotron (RCS) will be operated at a 25Hz sinusoidal alternating current which causes severe vibration. The vibration will influence the long-term safety and reliable operation of the magnet. By taking the magnet and magnetic measurement girder as a specific model system, a method for analyzing and studying the dynamic characteristic of the system is put forward by combining theoretical calculation with experimental testing. And the ctive vibration of magnet is different with passive vibration which was causes by ground vibration, so a new isolator was designed to decrease the vibratory force and avoid the resonance phenomenon.

Student Poster Panel SUPWO044
ID: 2459 - WEPME045 ***Development and Validation of a Multipoint based Laser Alignment System for CLIC*****, Guillaume Stern (CERN, Geneva),** Guillaume Stern, Friedrich Lackner, Helene Mainaud Durand, Didier Piedigrossi, Jacek Sandomierski, Mateusz Sosin (CERN, Geneva), Alain Geiger, Sébastien Guillaume (ETH, Zurich) - CLIC (Compact LInear Collider) is a study for a future electron-positron collider that would allow physicists to explore a new energy region beyond the capabilities of today's particle accelerators. Alignment is one of the major challenges within the CLIC study, since all accelerator components have to be aligned with an accuracy up to 10 μm over a sliding window of 200 m. So far, the demand for a straight line reference has been based on stretched wires coupled with wire positioning sensors. However, it should be validated through inter-comparison with a different solution, that could be an alternative. Therefore, a new metrological approach is proposed using a laser beam as straight line reference. Optical shutters paired with cameras are proposed to visualise the laser beam. In a first iteration, the principle was validated by a series of tests using low-cost components. Yet, in order to further decrease measurement uncertainty in this validation step, a high-precision automatised micrometric table and reference targets have been added to the setup. The paper presents the results obtained with this new configuration, in terms of measurement precision and repeatability.

Student Poster Panel SUPWO045
ID: 2290 - WEPME027 ***Analysis of Tidal Effects on Measurement Accuracy of HLS*****, Shaofeng Xu (USTC/NSRL, Hefei, Anhui),** Shaofeng Xu, Xiaoye He, Peng Wang, Wei Wang, Qiuyang Yao (USTC/NSRL, Hefei, Anhui) - HLS* is mainly used in survey and high-accuracy alignment in particle accelerator. Monitoring the earth tides is primarily introduced in this paper. Based on the earth tide theory and the ocean load effects on the planet earth, the tidal effects on a hydrostatic leveling system is analyzed.Firstly, the influence of the tides on the planet earth is verified by using frequency analysis. Secondly, by using the software ETERNA recommended by ICET**, the tidal effects on the region where the HLS are installed can be simulated. From the readings obtained from HLS, by deleting the tidal effects on HLS, finally, And the tidal correction of the HLS data based on local tidal model is completed, thus the actual ground deformation is obtained.
* HLS-hydrostatic levelling system
ICET-International Center for Earth Tides
Natural Science Foundation of China

Student Poster Panel SUPWO046

ID: 2137 - THPEA015 ***Induced Radioactivity Research for Scraper of Linac*****, Lijuan He (USTC/NSRL, Hefei, Anhui),** Lijuan He (USTC/NSRL, Hefei, Anhui) - The 200MeV electron linac of NSRL is one of the earliest high-energy electron linear accelerators in China.The electrons are accelerated to 200MeV by five accelerating tubes and collimated by the scraper followed each accelerating tube.The scraper aperture is smaller than the accelerating tube,so some electrons will hit on the structure materials when they pass through them.These lost electrons will cause induced radioactivity due to bremsstrahlung, cascade shower and photo-nuclear reaction.This paper gives the simulation to different energy electrons lost at the corresponding scraper by EGSnrc.The results showed that electrons were lost mainly at the scraper during the accelerating period,and the actual measurement confirmed this.Meanwhile,the induced radionuclide types have been studied.Recently,the linac mentioned above has been retired because of upgrading.The equipments and materials removed are used to study induced radioactivity generated in different materials.The research will provide the theoretical basis for the similar accelerator decommissioning plan,and is also significant for accelerator structure design,material selection and radiation protection programs design.

Student Poster Panel SUPWO047
ID: 3497 - WEPFI015 ***Design and Field Measurements of a Linear Accelerator provided by a Single Feed with Movable Short Coupler,*** **Massimo Dal Forno (ELETTRA, Basovizza; University of Trieste, Trieste),** Massimo Dal Forno (ELETTRA, Basovizza; University of Trieste, Trieste), Paolo Craievich (ELETTRA, Basovizza; PSI, Villigen), Roberto Vescovo (University of Trieste, Trieste) - The free electron laser performances strongly depend on the beam quality. The dipolar field present in the linac coupler causes the beam emittance degradation. This paper studies an alternative solution for reducing the dipolar field, by using a symmetrical coupler with single feed input and a movable short circuit placed on the opposite waveguide. The structure has been simulated and optimized with the Ansys HFSS simulation code. An aluminum prototype has been machined in the workshop of "Elettra - Sincrotrone Trieste S.C.p.A.". After matching and tuning the accelerating structure, the phase advance and the coupler field asymmetries have been measured by means of the bead-pull method and have been compared with the simulation results.

Student Poster Panel SUPWO048
ID: 2713 - WEPFI023 ***Study on Two-cell RF-deflector Cavity for Ultra-short Electron Bunch Measurement*****, Yuichi Nishimura (Waseda University, Tokyo),** Yuichi Nishimura, Kazuyuki Sakaue, Takenoshin Takahashi, Masakazu Washio (Waseda University, Tokyo), Toshikazu Takatomi, Junji Urakawa (KEK, Ibaraki) - We have been developing an S-band Cs-Te photocathode rf electron gun system for pulse radiolysis and laser Compton scattering experiment at Waseda University. These researches demand for high quality and well controlled electron beam. In order to measure the ultra-short electron bunch, we decided to use rf-deflector cavity, which can convert the longitudinal distribution to that of transverse. With this technique, the longitudinal bunch profile can be obtained as the transverse profile. We used the 3D electromagnetic simulation codes HFSS for designing rf deflector cavity and GPT for beam tracking. The cavity has 2 cell structures operating on π mode, standing wave, dipole (TM120) mode at 2856MHz. We have confirmed on HFSS that 2 cell rf-deflector cavity can produce 660G magnetic field per cell on beam line with 750kW input rf power. This field strength is enough for our target, which is 100fs bunch length measurement at 4.3MeV. In this conference, we will present the cavity structure design, the present progresses and future plan.
Work supported by JSPS Grant-in-Aid for Scientific Research (A) 10001690 and the Quantum Beam Technology Program of MEXT.

Student Poster Panel SUPWO049
ID: 2624 - WEPFI039 ***New X-band Deflecting Cavity Design for Ultra-short Bunch Length Measure of FEL at SINAP*****, Jianhao Tan (SINAP, Shanghai),** Jianhao Tan, Wencheng Fang, Qiang Gu, Zhentang Zhao (SINAP, Shanghai) - For the development of Free Electron Lasers (FEL) at SINAP, ultra-short bunch is the crucial requirement for excellent lasing performance. It's big challenge for deflecting cavity to measure the length of ultra-short bunch, and higher deflecting gradient is required for higher measurement resolution. X-band travelling wave deflecting structure has features of higher deflecting voltage and compact structure, which is good performance at ultra-short bunch length measuring. In this paper, a new X-band deflecting structure was designed, operated at HEM11- 2π/3 mode. For suppressing the polarization of deflection plane of the HEM11 mode, two symmetrical caves are added on the cavity wall to separate two polarized modes. More details of design and simulation results are presented in this paper.

Student Poster Panel SUPWO050

ID: 2408 - WEPWO005 ***Microphonics Analysis of the sc 325 MHz CH-Cavity*****, Michael Amberg (IAP, Frankfurt am Main; HIM, Mainz),** Michael Amberg (IAP, Frankfurt am Main; HIM, Mainz), Kurt Aulenbacher (HIM, Mainz; IKP, Mainz), Marco Busch, Florian Dirk Dziuba, Holger Podlech, Ulrich Ratzinger (IAP, Frankfurt am Main) - Since the walls of superconducting (sc) cavities are kept very thin to support the cooling process, even small mechanical disturbances can detune the cavity. One of the main sources of detuning a cavity is microphonics. These low-frequent vibrations caused by vacuum pumps or underground noise are transferred to the cryostat and excite mechanical resonances of the cavity which may lead to frequency shifts larger than the bandwidth. To determine the mechanical resonance frequencies of the sc 325 MHz CH-cavity (Crossbar-H-Mode) simulations with ANSYS Workbench have been performed in a first step. Additionally, microphonics measurements were taken at room temperature as well as in a vertical cryostat at 4K in the cryo-lab of the IAP, Frankfurt University. Furthermore, the contraction of the cavity walls and the resulting frequency shift due to the cavity cool-down has been measured. A comparison between simulation results and the measured values is presented in this paper.

Student Poster Panel SUPWO051

ID: 2901 - WEPWO044 ***RF Characterization of Niobium Films for Superconducting Cavities*****, Sarah Aull (CERN, Geneva; University of Siegen, Siegen),** Sarah Aull (CERN, Geneva; University of Siegen, Siegen), Sergio Calatroni, Steffen Doebert, Tobias Junginger (CERN, Geneva), Giovanni Terenziani (CERN, Geneva; Sheffield University, Sheffield), Jens Knobloch (HZB, Berlin), Arutiun Papken Ehiasarian (Sheffield University, Sheffield) - The surface resistance RS of superconductors shows a complex dependence on the external parameters such as temperature, frequency or radio-frequency (RF) field. The excited modes of 400, 800 and 1200 MHz allow measurements at actual operating frequencies of superconducting cavities. Niobium films on copper substrates have several advantages over bulk niobium cavities. HiPIMS (High-power impulse magnetron sputtering) is a promising technique to increase the quality and therefore the performance of niobium films. This contribution will introduce CERNs recently developed HiPIMS coating apparatus. Moreover, first results of niobium coated copper samples will be presented, revealing the dominant loss mechanisms.
Work supported by the Wolfgang-Gentner-Programme of the Bundesministerium für Bildung und Forschung (BMBF)

Student Poster Panel SUPWO052

ID: 3430 - WEPWO029 ***Design of a SRF Quarter Wave Electron Gun at Peking University***, Kexin Liu (PKU/IHIP, Beijing), **Peiliang Fan**, Kexin Liu, Shengwen Quan, Feng Zhu (PKU/IHIP, Beijing) - The development of improved electron guns is widely believed to be a key requirement for future high average power free-electron lasers (FELs) and energy recovery linacs (ERLs). Of all the electron guns,superconducting radio-frequency (SRF) electron guns have a lot of potential advantages. Peking University is designing a new SRF gun which is composed of a quarter wave resonator (QWR) and an elliptical cavity. The goal of the SRF gun is that it can deliver energy of about 5MeV, normalized transverse emittance of about 1mmmrad, and average current of 10mA electron beam. The QWR cavity works at 325MHz and the elliptical cavity works at 1.3GHz. Comparing to the elliptical cavity, the QWR provides quasi-DC electric field to the electron beam. The elliptical cavity adopts to TESLA type. We put on the emphasis on the design of the QWR cavity. In this paper, the optimization of the cavity geometric structure, beam dynamics simulation and the calculation of multipacting of the QWR cavity, cathode stalk shaping, minimization of the dissipated

power due to the cathode interposition to the SRF cavity will be presented.
Work supported by National Basic Research Project (No. 2011CB808302) and National Natural Science Funds (No. 11075007)

Student Poster Panel SUPWO053
ID: 2789 - WEPWO028 ***Large-scale MgB2 Film Fabricated by HPCVD for SRF Cavities*****, Fa He (PKU/IHIP, Beijing),** Fa He, Kexin Liu, Zhimao Ni, Datao Xie (PKU/IHIP, Beijing), Qingrong Feng (Peking University, Beijing) - Magnesium diboride (MgB2) is one of candidate material for superconducting radio frequency cavities because of its good features: high transition temperature of ~39K and absence of weak links between grains which prevents other high-Tc superconducting materials, such as YBCO. Previous study of MgB2 was mainly focused on the films' superconducting properties fabricated on Al2O3, SiC or some metal substrates with small scale less than 10×10 mm^2. In this work we explore a technique to deposit clean and large-scale MgB2 films on Mo substrate, which is expected to provide a probable way to fabricate MgB2 thin-film cavities. The measurement results show that its superconducting properties and mechanical behaviors are as good as those fabricated on small-scale metal substrates.

Student Poster Panel SUPWO054
ID: 3073 - WEPWO068 ***Cornell ERL Main Linac 7-cell Cavity Performance in Horizontal Test Cryomodule Qualifications*****, Nicholas Valles (CLASSE, Ithaca, New York),** Nicholas Ruben Alexander Valles, Benjamin Bullock, Brian Clasby, Fumio Furuta, Mingqi Ge, Daniel Gonnella, Yun He, Ka Mun Vivian Ho, Georg H. Hoffstaetter, Matthias Liepe, Tim O'Connell, Sam Posen, Peter Quigley, James Sears, Maury Tigner, Vadim Veshcherevich (CLASSE, Ithaca, New York), Brendan Elmore (Cornell University, Ithaca, New York), Ashley Holbrooks (MVCC, Rome) - Cornell has recently finished producing and testing the first prototype 7-cell main linac cavity for the Cornell Energy Recovery Linac, and completed the prototype cavity qualification program. This paper presents quality factor results from the horizontal test cryomodule (HTC) measurements, from the HTC-1 through HTC-3 experiments, reaching Q's up to 6 x 10^{10} at 1.6 K. We investigate the effect of thermal cycling on cavity quality factor and show that high quality factors can be preserved from initial mounting to fully outfitting the cavity with side-mounted input coupler and beam line absorbers. We also discuss the production of six additional main-linac cavities as we progress toward constructing a full 6-cavity cryomodule.
NSF DMR-0807731

Student Poster Panel SUPWO055
ID: 2432 - WEPWO004 ***Studies of Systematic Flux Expulsion in Superconducting Niobium*****, Julia Marie√Vogt (HZB, Berlin),** Julia Marie Vogt, Jens Knobloch, Oliver Kugeler (HZB, Berlin) - The quality factor Q0 that can be obtained in a superconducting cavity is known to depend on various factors like niobium material properties, treatment history and magnetic shielding. We believe that cooling conditions have an additional impact, as they appear to influence the amount of trapped flux and hence the residual resistance. We have constructed a test stand using niobium rods to study flux trapping. Here we can precisely control the temperature and approach Tc from below in the superconducting state. Although the sample remains in the superconducting state, a change in the amount of trapped flux is visible. The procedure can be applied repeatedly resulting in a significantly lowered level of trapped flux in the sample. Furthermore, simulations using the Radia software package for Mathematica developed by the ESR were used to better unterstand the measured changes in magnetic flux around the Sample. Applying a similar procedure for minimization of trapped magnetic flux to a superconducting cavity could allow for reduction of the magnetic contribution to the surface resistance and result in a significant improvement of Q0.

Student Poster Panel SUPWO056
ID: 2472 - WEPWO087 ***Parameter Optimization on Laser Polishing of Niobium for SRF Applications,*** **Liang Zhao (The College of William and Mary, Williamsburg),** Liang Zhao (The College of William and Mary, Williamsburg), J. Michael Klopf, Charles E. Reece (JLAB, Newport News, Virginia), Michael Kelley (JLAB, Newport News, Virginia; The College of William and Mary, Williamsburg) - Superconducting radio frequency niobium cavities play an important role in many accelerator projects. Surface smoothness is critical to the performance of these cavities. As laser technology has been widely applied on metal machining and surface treatment, we are encouraged to use it on niobium as an alternative to the traditional wet polishing process where aggressive chemicals are involved. In this study, we describe progress toward smoothing by optimizing laser parameters and surface conditions using a High Intensity Peak Power Oscillator (HIPPO) laser. Both laser parameters and sample surface condition contribute to the finish of niobium surface after laser polishing.

Student Poster Panel SUPWO057
ID: 2844 - WEPFI024 ***Anisotropic Ferrite Focusing Magnet for Klystron*****, Yasuhiro Fuwa (Kyoto ICR, Uji, Kyoto),** Yasuhiro Fuwa, Hideki Ikeda, Yoshihisa Iwashita, Ryunosuke Kitahara, Yuji Nasu, Hiromu Tongu (Kyoto ICR, Uji, Kyoto), Shigeki Fukuda, Toshihiro Matsumoto, Shinichiro Michizono (KEK, Ibaraki) - The permanent magnet beam focusing for klystrons can eliminate the solenoid coil with the water cooling system and the power supply that consumes electricity. Hence the failure rate and the operating cost of RF systems should decrease. This feature is suitable for a large facility that requires a lot of klystrons such as ILC. Since the required magnetic field for klystron beam is moderate, inexpensive anisotropic ferrite magnets can be applied. The test model is fabricated for a 1.3 GHz klystron whose output power is 800 kW. Each magnet block in the model is movable for magnetic field adjustment and the iron yoke in the oil tank improves magnetic field distribution around cathode area. The result of a klystron power test will be presented.

Student Poster Panel SUPWO058
ID: 2700 - WEPFI033 ***Development of the HLS 40kW Solid State Amplifier*****, Hongxiang Lin (USTC/NSRL, Hefei, Anhui),** Hongxiang Lin, Guirong Huang, Chao Li, Yongtao Liu, Weishi Zhou (USTC/NSRL, Hefei, Anhui) - A 40kW RF Solid State Amplifier (SSA) will replace the 25kW tetrode amplifier as the new RF power generator of HLS 800MeV electron storage ring. This SSA contains sixty-five 650W amplifier units (one unit drives sixty-four's), with two-stage combination to reach the 40kW output. All of the components of SSA are prepared and tested, each of them meets the design requirements. The SSA has been assembled, and is in off-line testing now. The process of SSA's design and manufacture, and the test results are presented in this paper.

Student Poster Panel SUPWO059
ID: 2208 MOPWA015 ***The Control Strategy Research on Two Kinds of Topological Pulse Power Supply*****, Chunfeng Shi (IMP, Lanzhou),** Chunfeng Shi (IMP, Lanzhou) - This paper introduces a kind of pulsed power supply at HIRFL-CSR, analyzes the ripple and current error of the quadrupole magnet power supply in the operation process, and gives a two-stage topology of pulsed power supply. The control method is simulinked and the results show that the new one can make up for the deficiencies of the existing pulse power supply and the main circuit structure and control method are feasible.

Student Poster Panel SUPWO060
ID: 2591 - MOPWA012 ***State Space Identification of Magnets and Converters - Considerations and Simulations*****, Kun Shu (IHEP, Beijing)**, Kun Shu (IHEP, Beijing) -

Dynamic performance is one of the main characteristics in magnet power supplies. In contrast to conventional PS controller design where magnet load is treated as black box, features of controlled objects should be taken into consideration in modern PS control system design to reach higher bandwidth. This research focuses on identifying the controlled objects in complex field situations, and revealing the deterministic characteristics of the magnet loads. By introducing in the state space identification, a state space model, similar to the underlying object, could be obtained, as well as a certain identification algorithm which demonstrates the whole process. The work to be posted is this identification algorithm particularly for PS convertors and magnet loads, and some simulation results are illuminated, where the physical and identified model are compared.

Student Poster Panel SUPWO061

ID: 3377 - MOPWA009 ***Development of a Fast Compensation Kicker System for J-PARC Main-ring Injection*****, Shota Fukuoka (University of Tsukuba, Tsukuba, Ibaraki),** Shota Fukuoka (University of Tsukuba, Tsukuba, Ibaraki), Kuanjun Fan, Koji Ishii, Hiroshi Matsumoto, Takuya Sugimoto (KEK, Ibaraki) - Injection system of J-PARC main ring employs four lumped kickers to deflect the incoming beam. The residual field caused by tail and reflection of excitation current increases the closed beam orbit leading to particle loss in high power operation. A correction method using a fast kicker system to compensate the remaining angle is being developed. Doe to the narrow bunch spacing, transmission line kicker is selected to satisfy requirements of fast rise and fall time. The kicker magnet uses ceramic capacitors instead of parallel metal plates to make the magnet compact and reduce the stray inductance. Capacitors are installed in vacuum chamber. A very thin core is used to reduce distributed inductance. A bandwidth is calculated as 160 MHz. A Marx generator using FET switches has been studied, which is able to produce fast rise and fall time as 50 ns. Any pulse shape is generated by choosing switches to fire. A prototype magnet and a power supply have been fabricated for parameters test. In this paper, we will report the details of the system design, analyze the measurement results and give future prospects.

Student Poster Panel SUPWO062

ID: 2076 - THPFI061 ***Design Process of the Interlock Systems for the Compact Linear Collider*****, Patrice Nouvel (CERN, Geneva),** Patrice Nouvel, Michael Jonker, Bruno Puccio (CERN, Geneva) - Interlock systems are a critical part for the machine protection of linear colliders. Their goal is to inhibit the next pulse either on failure of critical equipment and/or on low beam quality evaluation. This paper presents the on-going process to validate design choices for the Compact Linear Collider (CLIC) interlock systems. The design process starts by establishing requirements. In mission-critical system case, they are mainly focused on the dependability. Moreover, the new concept of fast beam quality analysis has been introduced into the CLIC interlock system and will be discussed in this paper. To support the design process, experimentation on this concept has been launched. In addition, a hardware demonstration of the interlock systems has been set-up. It allows validating the design in concordance with the requirements.

Student Poster Panel SUPWO063

ID: 2671 - THPFI029 ***The Structure Design and Analysis of Proton Beam Window for CSNS*****, Haijing Wang (IHEP, Beijing),** Haijing Wang, Ling Kang, Renhong Liu, Huamin Qu, Donghui Zhu (IHEP, Beijing) - The proton beam window (PBW) is one of the key devices of China Spallation Neutron Source (CSNS). In this paper, a new designed PBW structure called single-double layer structure is discussed and analyzed. The new structure will be used in CSNS, and it is designed based on the beam characteristic of CSNS, which power is 100 kW. The structure design and thermal-analysis are presented, and the convective

coefficient of cooling water is calculated to propose applicable velocity and pressure. The affordable power of this PBW structure is analyzed, which shows it can only be used in low power accelerates. Besides, some detailed technological designs are discussed to assure the PBW can be machined properly.

Student Poster Panel SUPWO064
ID: 2453 - THPWA008 ***Design of a Fast-cycling High-gradient Rotating Linac for Proton Therapy*****, Alberto Degiovanni (TERA, Novara),** Alberto Degiovanni, Ugo Amaldi, Daniele Bergesio, Paolo Magagnin, Pierluigi Riboni, Valeria Rizzoglio (TERA, Novara) - General interest has been shown over the last years for the development of single room facilities serving a population of about 2 million people for proton cancer therapy. Compact machines are needed to accelerate proton beams of few nanoamperes up to 230 MeV. In this framework the project TULIP (Turning LInac for Protontherapy), proposed by TERA Foundation, foresees a linac mounted on a rotating gantry used as a booster for protons previously accelerated by a cyclotron. The linac is composed of modular units powered by independently controlled klystrons. The RF power transmission is made possible by high power rotating joints developed in collaboration with CLIC group. The final beam energy can be varied in steps of few MeV from pulse to pulse by amplitude and/or phase modulation of the klystron signals, making possible the implementation of active spot scanning technique with tumor multipainting. The present paper provides the main characteristics of TULIP, describing the different choices for the linac design parameters together with the structural design of the supporting gantry and of the final beam line.

Student Poster Panel SUPWO065
ID: 2920 - THPWA039 ***GEANT4 Target Simulations for Low Energy Medical Applications,*** **Naomi Ratcliffe (University of Huddersfield, Huddersfield),** Naomi Ratcliffe, Roger John Barlow, Adriana Bungau, Cristian Bungau, Robert Cywinski (University of Huddersfield, Huddersfield) - The GEANT4 code offers an extensive set of hadronic models for various projectiles and energy ranges. These models include theoretical, parameterized and, for low energy neutrons, data driven models. Theoretical or semi-empirical models sometimes cannot reproduce experimental data at low energies(<100MeV), especially for low Z elements, and therefore recent GEANT4 developments included a new particle_hp package which uses evaluated nuclear databases for proton interactions below 200MeV. These recent developments have been used to study target designs for low energy proton accelerators, as replacements of research reactors, for medical applications.Presented in this paper are results of benchmarking of these new models for a range of targets, from lithium neutron production targets to molybdenum isotope production targets, with experimental data. Also included is a discussion of the most promising target designs that have currently been studied.

Student Poster Panel SUPWO066
ID: 2259 - THPWA025 ***Ferroelectric and Magnetic Properties of ZnCoO:Li prepared by Ion Implantation*****, Zesong Wang (Wuhan University, Wuhan),** Zesong Wang, Dejun Fu (Wuhan University, Wuhan) - Multiferroic materials are interesting due to their magnetization can be controlled by applying an electric field and dipole moment can be poled by a magnetic field. We prepared ZnCoO: Li samples by ion implantation with lithium and cobalt at energies of 50 keV and 400 keV, respectively, so that both ions were located in an approximately same region. The samples were annealed in oxygen ambient at 973K. Ferroelectric measurement gave a remnant polarization of a few microcoulomb per square centimeters and magnetic measurement revealed evident magnetization. The ferroelectric and magnetism are interpreted by the ionic radius difference between the dopants and host cations and magnetic polarons, respectively

Student Poster Panel SUPWO067
ID: 2212 - THPWA021 ***Studies of Tensity Distribution and Emittance Measurement for High Current Electronic Beam*****, Qi-Cheng Li (SINAP, Shanghai),** Qi-Cheng Li, Zi-Feng He, Jian-Ming Huang, Deming Li, Yu-Tian Zhang, Xi-Kai Zhu (SINAP, Shanghai) - Beam tensity distribution and emittance are the important parameters of an accelerator. The accurate emittance measurement has an important reference significance for the design of accelerating tube, and provides a design basis for the aperture size of accelerating tube. This paper introduces a beam measurement method which uses multiwire, can rotate in the horizontal plane and adjust in the Z coordinate. The results of simulation show that this method can accurately measure the beam tensity distribution and emittance, and the accuracy can meet the requirements of applied accelerator.

Student Poster Panel SUPWO068
ID: 2215 - THPWA023 ***Research on Modeling of the High-density Current Electron Gun System Based on T-S Fuzzy Model*****, Bin Lv (SINAP, Shanghai),** Bin Lv, Jian-Ming Huang, Deming Li, Hai Jun Su (SINAP, Shanghai) - The stability of the electron beam is considered as an important performance of industrial electron accelerators. For the beam control system of the accelerator, it is significant to obtain the accurate model of the electron gun system. The paper presents a modified modeling method based on T-S fuzzy model, which builds the nonlinear dynamic fuzzy model using its input-output measurement data. Firstly, an improved recursive fuzzy clustering method is proposed and applied to identify the model structure and the premise parameters online. Then the recursive least square algorithm is used to identify the consequent parameters. Secondly, the genetic algorithm is applied to optimize the initial fuzzy model. Finally, the T-S fuzzy model about filament voltage and beam current is built by using the data measured in the electron gun experiment. The simulation results show that the T-S fuzzy model is very well to describe the high-density current electron gun system and reveal its performance.