Asian Forum for Accelerators and Detectors 2023

Report of Contributions

https://events01.synchrotron.org.au/e/169

Contribution ID : **3** Type : **Talk**

Research Advances in Key Technologies of Ultra-Large Cryo-plants in TIPC of CAS

Wednesday, 12 April 2023 16:00 (20)

The ultra-large cryogenic refrigeration system refers to the refrigeration system from liquid hydrogen with equivalent refrigeration capacity greater than or equal to 10000 watts at the liquid helium temperature to the superfluid helium temperature zone. It is an indispensable key system in the fields of helium resource development, aerospace engineering, nuclear energy utilization, hydrogen energy utilization, and large scientific devices, and is also a national strategic support equipment. This report introduces the research progress of key core technologies for the serialization of 10000-watt cryogenic refrigerators, such as the process design and integrated design of ultra-large cryogenic refrigeration systems, the stability of high-speed and heavy-load hydrogen/helium gas bearing turbine expanders, the stability of large-flow centrifugal refrigeration compressors, and the internal purification of helium liquors.

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Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **4** Type : **Talk**

CRYOGENIC SYSTEM FOR THE HIGH ENERGY PHOTON SOURCE AT IHEP

Wednesday, 12 April 2023 14:20 (20)

High Energy Photon Source (HEPS) is a high-performance and high-energy synchrotron radiation light source with a beam energy of 6GeV and an ultra-low emittance of better than 0.06nm×rad. The HEPS is mainly composed of accelerator, beamlines and end-stations. The HEPS would provide the synchrotron beam with will brilliance higher than 1×1022 phs/s/mm2/mrad2/0.1%BW. And the hard X-ray with photo energy up to 300 keV would be provide in order to satisfy the requirement of in operando experiments. No less than 90 high performance beamlines and end-stations are capable to be built around the storage ring. The HEPS will be an important platform for supporting the original and innovative research in the fields of basic science and engineering science, and it also is scheduled to be put into operation in 2025 at Institute of High Energy Physics (IHEP) in China. A large cryogenic system will support a cryogenic environment temperature demand of the HEPS, which includes a helium refrigerator system and a nitrogen cryogenic plant. The helium refrigerator system consisted of a helium refrigerator on a capacity at 2500W@4.5K, a cryogenic distribution transfer system and helium recovery and purification system for 10 superconducting radio frequency cavity cryomodules. The nitrogen cryogenic plant is crucial for creating and maintaining operational conditions of the thermal shield of superconducting radio frequency cavity cryomodules, precooling the helium refrigerator coldbox, cooling photon beamline crystats and cryogenic inserts in the HEPS. The nitrogen cryogenic plant has an average capacity about 50kW at 80K in the HEPS phase I. The nitrogen cryogenic plant is mainly included of nitrogen cycle refrigerator system, liquid nitrogen tank and cryogenic fluid distribution tube network. The cryogenic system project engineering implementation has started at June 2019. The Schematic diagram, status and recent development of the cryogenic system are described in this paper.

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Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **5** Type : **Talk**

PandaX-4T: A Multi-Ton Liquid Xenon Detector for Dark Matter and Neutrino Physics

Thursday, 13 April 2023 11:40 (20)

Dark matter, a new non-luminous matter which is induced from the astronomical observation, play a leading role in the universe component. PandaX dark matter direct detection experiment established from 2009 have been operated for three phases with 120~kg to 4~ton target liquid xenon. The PandaX-4T experiment, located at China JinPing Underground laboratory II, started the data taking from 2020 and have been released the first commissioning result for the dark matter and neutrino analysis. In this report, I will introduce the PandaX-4T main technical improvements, operation conditions and the brief physical results.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **6** Type : **Talk**

The R&D of Fast MCP-PMT for High Energy Physics Detectors

Thursday, 13 April 2023 15:00 (20)

The Micro-Channel Plate (MCP) is a specially crafted microporous plate with millions of independent channels, which have secondary electron emission capability. The MCP could be used as the electronic multiplier amplifier in the PMTs. There are two types of MCP Photomultiplier tube (MCP-PMT), large-area electrostatic focusing PMTs (LPMT) and small size proximity focusing PMTs (FPMT) respectively. The LPMT always used in the large scalar neutrino detector for it's large area efficiency photocathode. The small size FPMT is widely used in high energy physics for its fast time response, strong anti-interference ability. The MCP-PMT Collaboration Group in China has successfully research and developed the LPMT for JUNO in 2017, and plan to research a new type of FPMT with multi-anode readout (4X4, 8X8). The FPMT prototypes have been produced with 50 ps time resolution, and also the 8X8 readout anode for the position resolution. We will introduce some design of the FPMTs for the time measurement, and the performance of the several different prototypes with different readout channels.

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Track Classification : WG2: Detector technology development

Contribution ID : **8** Type : **Talk**

A cylindrical trigger hodoscope system for the COMET phase-I experiment

Thursday, 13 April 2023 16:00 (20)

The COMET experiment searches for a muon to an electron transition without neutrinos, whose branching fraction is significantly enhanced in many plausible new physics beyond the standard model. The experiment will be performed under an extremely high particle rate environment, hence, the pile-up separation is essential to suppress the background particles while keeping high acceptance for signal events. As for the main trigger and timing detector, we are developing the cylindrical trigger hodoscope (CTH), which consists of two layered concentric plastic scintillators devided into 64 segments each. The design of CTH has been completed and several test measurements including the one at the Australian Synchrotron have been performed. In this talk, we will present those test results.

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Contribution ID : **9** Type : **Talk**

Neutron detectors and electronics for the instruments of CSNS

Thursday, 13 April 2023 14:20 (20)

Neutron science and technology plays an irreplaceable role in national defense and industry. China spallation neutron source (CSNS) is a major science and technology platform for multidisciplinary applications. As one of the most expensive core equipment of neutron instruments, the neutron detector plays a very important role in the construction and operation of neutron instruments at CSNS. Based on the requirements of the instruments, many common key technologies of neutron detectors have been studied and the detector system of large-scale engineering application has been preliminarily established. A professional and young team has been cultivated to be engaged in developing the advanced neutron detectors. The team has completed the construction of neutron detectors for General Purpose Powder Diffractometer (GPPD), Small Angle Neutron Scattering (SANS), Multifunctional Reflectometer (MR), Multi-Physics Instrument(MPI), Energy-Resolved Neutron Imaging instrument(ERNI), High Energy Direct-Geometry Inelastic Neutron Scattering Spectrometer(HD), Very Small Angle Neutron Scattering Instrument(VSANS) and Engineering Material Diffractometer (EMD). We have successfully developed a large area of scintillator detector , a large area of 3He tube array detector , an energy resolved neutron imaging detector and a ceramic GEM neutron detector. These detectors are under the final commissioning for operation. At the present, CSNS II will be constructed in this summer. Many kinds of detectors will be further developed to realize better performances including larger area, higher spatial resolution, higher detection efficiency and higher integration.

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Contribution ID : **10** Type : **Talk**

Present Status on Li-beam driving neutron generator R&Ds at BNL

Thursday, 13 April 2023 10:20 (20)

A compact accelerator-driven neutron generator with a lithium beam driver can generate neutrons in a forward direction, even using incident beam energy at a near-threshold energy. Especially for BNCT applications, the ability to suppress unwanted radiation to patients is a major advantage. However, it is difficult to supply a high-intensity lithium-ion beam, and its practical application has been considered impossible. Therefore, to solve the most important issue, the lack of ion flux, a direct plasma injection method was adopted. In this method, pulsed high-density plasma from a metallic lithium foil generated by laser ablation is efficiently injected and accelerated by a radio-frequency quadrupole linear accelerator (RFQ linac). As a result, a peak beam current of 35 mA, accelerated to 1.43 MeV, which is two orders of magnitude higher than the conventional injection/accelerator system, can be obtained.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **11** Type : **Talk (remote)**

Chip-size accelerator enabled single-electron FEL

Wednesday, 12 April 2023 16:20 (20)

Our study shows that a single electron or a train of single electrons from a dielectric laser accelerator is able to excite laser-like radiation from a nano-photonic chip.

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Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **12** Type : **Talk**

Realization of the in-house developed purifier module for LHe system and liquid nitrogen cooling system for cryogenic in-vacuum undulator

Wednesday, 12 April 2023 16:20 (20)

Two major in-house cryogenic techniques have been applied to the cryogenic in-vacuum undulator and helium gas purification module. The cryogenic in-vacuum undulator is used to generate high-brilliance X-rays at high photon energies and its liquid nitrogen cooling system maintains the magnet temperature at 170K. The purifier module improves the quality of the helium gas by using cold trap effect and includes a molecular sieve to effectively trap moisture. The liquid nitrogen cooling system for the in-vacuum undulator has been commissioned and its functioning well. The combined function for the purifier module has been fabricated, and function testing is expected to be completed by the end of 2023.

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Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **13** Type : **Talk**

High brightness photoinjector driven high-resolution high-energy X-ray CT

Wednesday, 12 April 2023 16:40 (20)

High-resolution high-energy X-ray computed tomography is one of the most effective methods for inspection of high-density samples with fine structures. Theoretically, minimizing the effective focal spot size of the X-ray source can significantly improve spatial resolution of X-ray CT. In the paper, we report our progress on high-resolution high-energy X-ray CT driven by a bright photoinjector, which can generator high quality electron beams with low emittance and low energy spread. Using strong focusing magnets, 9 MeV high-brightness electron beams are focused down to a few tens of microns and then impact on a specially designed tungsten target to form a micro-focus X-ray source. Experimental outcomes show that an ultra-high resolution of 10 Lp/mm has been readily obtained, thus verifying the effectiveness and potential of bright photoinjector driven high-resolution high-energy X-ray CT.

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Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **14** Type : **Talk**

PID and high spatial resolution of Time Projection Chamber technology at e+e- collider

Thursday, 13 April 2023 16:20 (20)

The Circular Electron Positron Collider (CEPC) and Future Electron Position Circular Collider (FCCee) were been proposed as a Higgs and high luminosity Z factory in last few years. The detector conceptual design of a updated detector consists of a tracking system, which is a high precision (about 100μm) spatial resolution Time Projection Chamber (TPC) detector as the main track device in very large 3D volume. The tracking system required the high precision performance requirements, but without power-pulsing not likely as the International Linear Collider (ILC), which leads to additional constraints on detector specifications, especially for the case of the machine operating at the high luminosity Z pole (Tera Z). TPC detection technology requires longitudinal time resolution of about 100ns and the physics goals require Particle Identification Detection (PID) resolution of very good separation power with cluster counting to be considered. A number of critical issues are still remaining regarding the TPC research. The simulation and PID resolution show TPC technology potential to extend Tera Z at the future e+e- collider.
In this talk, I will present the feasibility and status of high precision TPC as the main track detector for e+e collider. The traditional pad readout is designed about 1mm x 6mm and the pixelated readout is designed about 55μm x 5μm or bigger size. Compared with the pad readout, the pixelated readout option will obtain the better spatial resolution of single electrons, the very high detection efficiency in excellent tracking and good dE/dx performance. A smaller prototype TPC has been developed with a drift length of 500 mm, gaseous chamber, 20000V field-cage, the low power consumption FEE electronics and DAQ have been commissioned and some studies have been finished. Some updated experimental results including the spatial resolution, the gas gain, the laser track reconstruction and dE/dx will be reported. The track performance results and summarize the next steps of the pad/pixelated TPC technology for e+e- collider will presented in this talk.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **15** Type : **Talk**

Operation status and future plan of the SRF module at NSRRC

Wednesday, 12 April 2023 16:40 (20)

NSRRC in Taiwan houses two light sources: Taiwan Light Source (TLS) and Taiwan Photon Source (TPS). TLS has an electron energy of 1.5 GeV and a beam current of 360 mA, while TPS has an electron energy of 3.0 GeV and a beam current of 500 mA. Both light sources use SRF modules as their accelerating cavities. These SRF modules have been in operation for approximately 18 and 7 years for TLS and TPS, respectively. In this report, we will present the current operation status of these SRF modules, as well as the future plans for the SRF modules in TPS.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **16** Type : **not specified**

FLASH radiotherapy using high energy X-rays: Metrological challenge and solution in dose measurement

Thursday, 13 April 2023 14:00 (20)

Recent studies showed that ultra-high dose rate radiotherapy (FLASH radiotherapy) can selectively kill tumor tissues and protect normal tissues in vivo more significantly, which make possible to mitigate dramatically adverse reactions to aggressive radiation therapies even with limited geometrical conformity, and/or to extend the prescribed dose to unprecedented tumor control. However, FLASH-RT present significant metrological challenges because the established active detectors for real-time dosimetry as ionization chambers or diodes start to fail when the dose rate/dose-per-pulse is increased beyond what is used in conventional radiotherapy. Therefore, the improvement of gas ionization chamber and the development of FLASH dosimeters such as micro diamond, calorimeter and scintillator are being studied. Some metrological solutions for FLASH radiotherapy and critical physical and technical issues in dosimetry of high-energy X-ray FLASH will be introduced. Some of our experimental results on high-energy X-rays will also be presented in this paper.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **17** Type : **Talk**

The Introduction of 2K Superfluid Helium Cryogenic Test System for PAPS

Wednesday, 12 April 2023 14:40 (20)

Platform of Advanced Photon Source Technology R&D (PAPS) in the Institute of High Energy Physics (IHEP) is a finished project, which can provide a comprehensive research and testing platform for the particle accelerator, X-ray detection and optics. As one of the important parts of the platform, 2K superfluid helium cryogenic test system for the superconducting cavities is composed of three test stations, beam test station for 650MHz superconducting cavity, vertical and horizontal test station for many types superconducting cavity. The total capacity of the cryogenic system can reach 2.5KW@4K and 300W@2K. The vertical test stand for the superconducting cavities is composed of three big vertical test cryostats with 2 different inner diameters, which can provide 4.5K liquid helium, 2K superfluid helium and the lowest 1.5K environments according to the cavities test requirements. The horizontal test stand for the superconducting cavities is composed of valve box and crymodule, which can meet several different type cavities test, such as 1.3GHz 9cell, Spoke etc. Since the 2K superfluid helium cryogenic test system has been completed, hundreds of superconducting cavities have been finished vertical and horizontal test, the types of cavity contain 1.3GHz 9cell and single cell, 650MHz 2cell and single cell, double spoke, etc.

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Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **18** Type : **Talk**

A 70-MEV PROTON CYCLOTRON SYSTEM OF IBS FOR MULTIDISCIPLINARY UTILIZATION

Wednesday, 12 April 2023 15:20 (20)

A 70 MeV H- cyclotron system was commissioned in the Institute for Basic Science (IBS) using 40 - 70 MeV beams, and isotope separator on-line (ISOL) system is recently tested at a beam current of 1 μA. The beam commissioning was carried out primarily in the aspects of forming specified beam shapes at the entrance of ISOL target in cave A and testing a high-power beam of 50 kW at 70 MeV for six hours in cave B. A temporary beam line was installed in cave A to measure beam profiles formed by a 60-Hz wobbling magnet at the target location. A beam position monitor built in-house was used to measure beam off-center and currents. In addition, beam emittance was measured by variation of quadrupole strengths and using a beam profile monitor, which was compared to emittance used for beam transport calculation. All beam tests for site acceptance were completed by the end of 2022. Now we plan to install a neutron production target in cave B after a minor modification on the beam line. Also, medical isotope production is envisioned utilizing a spare vault, but first we need to install a new beam line extended from 2nd extraction port of the cyclotron, which will allow simultaneous extraction of two beams for instance for ISOL operation and isotope production. In the spare vault two isotope production targets can be accommodated to produce such as 68Ge and 67Cu.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **19** Type : **Talk**

Development of Electron Multiplier Tube as muon monitor

Thursday, 13 April 2023 16:40 (20)

The T2K experiment searches for CP violation of neutrinos.
Since off-axis beams are used to reduce the energy spread of the beam, beam direction measurement is very desirable.
The T2K beam is monitored by measuring the muon decayed from pion.
In the future, we plan to increase the beam power in order to increase the statistics.
Then, there is a need for sensors with better radiation resistance and signal linearity than the current sensors (SI, IC) for muon monitors.
Therefore, we have developed an EMT (electron multiplier) as a sensor for a new muon monitor.
In this talk, we will present the development of EMT, including the electron beam irradiation test at ELPH and the muon beam irradiation test at J-PARC.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **20** Type : **Talk**

Development status of beam diagnostic devices for Korea-4GSR project and PLS-II

Thursday, 13 April 2023 16:40 (20)

The Korea-4GSR project is a green-field project which was launched to build a diffraction-limited light source. The accelerator is aimed to achieve an emittance of less than 100 pm-rad with a kinetic energy of 4 GeV and a circumference of 800 m. Various beam diagnostics with a few micrometer spatial and picoseconds temporal resolutions are necessary to verify the beam quality. It contains a visible interferometric beam size monitor, gas photon position monitor, beam loss monitor, and bunch length monitor. The visible interferometric beam size monitor is newly developed to deconvolute ground motion by using a high-speed data acquisition and processing system. A gas-based photon beam position monitor, which is demanded to observe photon position at the front end of the beamline, is simulated to estimate position accuracy. The optical fiber-based beam loss monitor is designed, fabricated, and tested to confirm particle losses at different sections during bean injection.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **21** Type : **Talk**

Commissioning of X-LAB: a very high-capacity X-band RF test stand facility at the University of Melbourne

Wednesday, 12 April 2023 14:00 (20)

The Compact Linear Collider (CLIC) beam-based acceleration baseline uses high-gradient travelling wave accelerating structures at a frequency of 12 GHz. In order to prove the performance of these structures at high peak power and short pulse width RF, two klystron-based test facilities will been put in operation this year. The first Southern Hemisphere X-band Laboratory for Accelerators and Beams (X-LAB) is under commission at the University of Melbourne, and it will operate half of the CERN X-band test stand system, called XBOX3.
XBOX3 uses a novel way of combining relatively low peak power (6 MW) but high average power klystron units whose power is steered to feed two testing slots with RF to the required power with a repetition rate of up to 400 Hz. Besides the repetition rate, peak power, pulse length and pulse shape can be customized to fit the test requirements. This novel way of combining pulsed RF high power can eventually be used for many other applications where multiple test slots are required.

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Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **22** Type : **Talk**

ILU RF ELECTRON ACCELERATORS FOR E-BEAM AND X-RAY APPLICATIONS.

Wednesday, 12 April 2023 17:00 (20)

ILU type industrial accelerators are RF pulse accelerators with energy range from 0.8 to 10 MeV. First of these accelerators where designed 1970's. But market development requires continuous modernization of accelerators. Great prospects for the use of accelerators in industry are provided by a new market - food irradiation. The report describes accelerator upgrades associated with food irradiation and sterilization. For this, accelerators must operate with energies from 5 MeV to 10 MeV in the electronic mode and in the mode of bremsstrahlung gamma radiation. Two branches of ILU accelerators are described. One is based on an ILU-10 single-cavity accelerator and a vertical beam. The second is based on the ILU-14 multi-cavity accelerator, which has a horizontal beam. Both families are modular and upgradeable.

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Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **23** Type : **Talk**

Stand-Alone Cryomodule for HIAF booster upgrade

Wednesday, 12 April 2023 14:00 (20)

Stand-alone cryocooler-based systems allow applications at facilities where no cryogenic equipment and expertise is available at large scale, or where a mobile system can be moved between beam lines based on different application. The main technical challenge of this technology is to minimize the heat losses to the liquid helium so that commercial self-contained cryocoolers are able to handle the thermal load, both static and dynamic.
This talk will overview published data on the designs and preliminary experimental performance characteristics of srf resonator installed in cryomodule based on commercially available cryocoolers.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **24** Type : **Talk**

Development of high power irradiation accelerators in China

Wednesday, 12 April 2023 14:20 (20)

Irradiation accelerator use high power electron beam in the application of processing of food, medical product, quarantine treatments. Different types of RF linacs are developed in China at the electron beam energy of 10MeV and the beam power of 24kW. This presentation will focus on the basic theory of electron linacs and the improved design to obtain a high-power beam. The experiment results are discussed as well.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **25** Type : **Talk (remote)**

Advanced Quasistatic Approximation

Thursday, 13 April 2023 15:20 (20)

The quasistatic approximation (QSA) is an efficient method of simulating laser- and beam-driven plasma wakefield acceleration, but it becomes imprecise if some plasma particles make long longitudinal excursions in a strongly nonlinear wave, or if waves with non-zero group velocity are present in the plasma, or the plasma density gradients are sharp, or the beam shape changes rapidly. We present an extension to QSA that is free from many of its limitations and retains its main advantages of speed and reduced dimensionality. The new approach takes into account the exchange of information between adjacent plasma layers. We introduce the physical model, describe its numerical implementation, and compare the simulation results with available analytical solutions and other codes.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **26** Type : **Talk (remote)**

Ultra-high dose rate X-ray radiator for studing flash radiotherapy

Wednesday, 12 April 2023 15:00 (20)

Ultra-high-dose-rate (UHDR) radiation is considered to trigger the so-called flash effect which spares the normal tisse while retains the therapeutic effect on tumor. X-ray is the least explored modality compared to electron or proton. The main challenge is to have electron accelerator achieving both high power and fast response. We introduce a compact radiator using a 10-MeV, backward travelling wave linac. This radiator generated X-rays with dose rate of 80 Gy/s at the SSD of 50 cm. It worked stably with the dose fluctuation less than 1%.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **27** Type : **Talk (remote)**

LOW-ENERGY ELECTRON ACCELERATORS AND SOURCES WITH PLASMA EMITTERS FOR SCIENTIFIC AND TECHNOLOGICAL PURPOSES

Wednesday, 12 April 2023 17:20 (20)

At present, low-energy sources (up to 30 keV) and accelerators (up to 200 keV) of electrons find wide practical and scientific use and have a wide range of parameters of the generated electron beam, which is determined by the problem being solved. Thus, electron sources can also be used for processing various organic materials (polymers, gases, food or medical products, etc.), generating beams with a relatively low energy density, most often outputted into the atmosphere through an output foil window, or for processing various inorganic (metallic and cermet) materials in vacuum in order to change the functional and operational properties of their surface. Such problems can be rationally solved using sources of electrons with plasma emitters based on arc or glow discharges.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **28** Type : **Talk (remote)**

New painting injection scheme for the CSNS-II

Thursday, 13 April 2023 11:40 (20)

As the second phase of the CSNS, CSNS-II will achieve a beam power on the target of 500 kW. The injection energy of CSNS-II will be increased from 80 MeV to 300 MeV and the injection beam power will be increased about 20 times. Therefore, the injection system needs to be comprehensively upgraded and the injection scheme needs to be redesigned. Based on the experience of the CSNS and simulation results, it is hoped that the new injection scheme can not only be compatible with correlated and anti-correlated painting, but also must further reduce the temperature rise of the stripping foil. After in-depth analysis and simulation, a new painting injection scheme for the CSNS-II has been proposed. The chicane bump and horizontal painting bump are combined into one bump which makes the chicane bump "move", and the horizontal painting is performed by using the position and angle scanning at the same time. The new scheme not only realizes the compatibility of correlated and anti-correlated painting, but also greatly reduces the temperature rise of the stripping foil. After a comprehensive simulation study of the painting process, the new painting scheme has been verified to be feasible and has obvious advantages compared with the traditional bump painting scheme.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG5: Accelerator and its related technologies for hadron (neutron) science

Contribution ID : **29** Type : **Talk**

Radiotherapy LINAC Breakdowns in Low- and Middle-Income Countries

Thursday, 13 April 2023 10:00 (20)

Access to Radiotherapy Linear Accelerators (LINACs) remains a significant challenge in Low and Middle-Income Countries (LMICs) for effective cancer treatment. The complexity of LINACs is further compounded in LMICs by environmental, socio-economic, and geographical factors, resulting in frequent breakdowns, with downtimes lasting from days to months. Recent studies have identified the Multi-Leaf Collimator (MLC) subsystem as having a disproportionate failure rate, especially in LMICs, which calls for re-evaluation. Through an analysis of Indonesian facilities, we provide insight into the causes of downtime and failure pathways for RT LINACs in LMICs. We also show that MLC accounts for 59% of all mechanical faults in LINACs, with downtime being 7 times longer in LMICs than in High-Income Countries (HICs). Further analysis of MLC leaf width demonstrates that narrow 5mm leaves contribute to 18.27±6.5% of all breakdowns, while wider 10mm leaves make up 15.87±4.3%. These findings highlight the need to review the current generation of Radiotherapy LINACs and design future models that are more robust and suitable for all environments.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **30** Type : **Talk (remote)**

VITA for industrial and medical applications

Wednesday, 12 April 2023 14:40 (20)

Vacuum insulated tandem accelerator (VITA) – original electrostatic accelerator – was proposed, created and is used for investigations in boron neutron capture therapy (BNCT) and in many other applications. VITA is the part of accelerator based (AB) neutron source in which protons/deutrons with an energy in range from 0.3 to 2.3 MeV and current in range from 1 nA to 10 mA are transported to a lithium or another target. It results in generating neutrons with a wide range of energies – cold, thermal, epithermal, fast.
Industrial applications of the VITA are: quafilication and testing perspective materials for thermonuclear fusion, investigations of metal blistering and measuring of cross-sections of nuclear reactions.
Medical applications of the VITA are: investigations in BNCT, conducting BNCT on domestic animals. VITA became a prototype for the AB neutron source in Xiamen (China), which is now in clinical trials, and for the AB neutron source for N.N. Blokhin Oncology Center (Moscow, Russia).
In talk there will be given details about VITA and industrial and medical applications of the VITA.
This work was supported by the Russian Science Foundation (grant number 19–72-30005).

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **31** Type : **Talk**

Laser plasma wakefield accelerators with external injection for soft X-ray free electron laser at PAL-eLABs

Laser-plasma wakefield accelerators (LWFA) have been proposed as a potential solution for compact and high-energy free-electron lasers (FELs). However, the electron beam quality generated by LWFA may not meet the requirements for X-ray FELs. To overcome this challenge, one promising approach is to use an external seed beam from a radiofrequency (RF) photocathode with LWFA. Recently, the Injector Test Facility (PAL-ITF) was reconfigured to include two beam lines, GUN-I and GUN-II, and renamed as the Electron Linear Accelerator for Basic Science (e-LABs). The GUN-I beam line is dedicated to ultrafast electron diffraction (UED) experiments, while the GUN-II beamline is optimized for advanced accelerator experiments with an electron beam featuring an energy of 70 MeV, low emittance, and a jitter in the range of a few tens of femtoseconds. At the GUN-II beamline, we plan to conduct experiments involving LWFA that are injected with an electron beam from the RF gun. This presentation highlights our ongoing research and development plans and presents simulation results for generating soft X-ray FEL pulses using LWFA based on the electron beam generated by the external seed beam from GUN-II at PAL-eLABs.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **32** Type : **Talk (remote)**

Energy-conserving theory of strongly nonlinear plasma wakefields

Wednesday, 12 April 2023 14:40 (20)

We present a self-consistent model of plasma wakefields in the strongly nonlinear (”bubble” or “blowout”) regime based on the energy conservation law [1]. In this regime, a spherical plasma cavity (a bubble) devoid of plasma electrons is driven by a short intense laser pulse or a high-current electron bunch. The strong longitudinal fields of the bubble (which propagates with almost the speed of light through the plasma) are fit for accelerating electrons to very high energies. Using the energy conservation approach, we derive a new equation for the boundary of the bubble. Compared to previous models [2], the equation does not rely on additional parameters. At the same time, as the comparison to 3D particle-in-cell simulations shows, it describes the structure of the bubble and the fields in it more accurately, especially in the limit of a small bubble size. Based on the new model, we also develop a self-consistent description of the bubble excitation by an electron driver which makes it possible to calculate the structure of the driven wakefield based only on the parameters of the driver.

[1] A. Golovanov et al. Phys. Rev. Lett. 130, 105001 (2023)
[2] W. Lu et al. Phys. Rev. Lett. 96, 165002 (2006)

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **33** Type : **Talk (remote)**

Development of laser wakefield acceleration driven by few-TW pulses in a sub-mm, dense nitrogen gas target

Wednesday, 12 April 2023 14:20 (20)

Laser wakefield acceleration (LWFA) driven by few-TW laser pulses in a thin, dense nitrogen gas target represents a favorable approach for stably generating 10-MeV-scale electron beams with satisfactory beam properties. With a high plasma density > 10^{19} cm^{-3}, the self-focusing effect and the self-modulation instability developed on the pump pulse consequently cause a strong laser intensity to drive nonlinear plasma waves for acceleration, while the free-running ionization-induced injection from the ionization of nitrogen N^{5+} and N^{6+} ions can substantially enhance the energy and charge stabilities of output electron beams. To explore the performance of few-TW LWFA, we created sub-mm nitrogen gas cell and gas jet for interacting with 800-nm, 40-fs laser pulses having a moderate peak power of 1 TW; whereby, electron beams with primary energies scaling up to 10 MeV and a high charge in excess of 50 pC can be routinely generated when an appropriate atom/plasma density in the target and an optimal focal position of the pump pulse were assigned. The output beams showed a typical beam divergence < 40 mrad and the pointing fluctuation of them were estimated to be ~ 15 mrad, accordingly. This scheme exhibits a high potential for generating 10-20 MeV electron beams with an on-target pulse energy less than 50 mJ, from which a high average beam current up to tens of nA can be realized in future development of high-repetition-rate LWFA driven by kilohertz-class laser systems.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **34** Type : **Talk (remote)**

Materials science research at Indus beamlines

Thursday, 13 April 2023 11:20 (20)

Indus 1 and Indus-2 are India's only two synchrotron radiation sources, designed and developed in India. Both these machines were designed in the early 1990s, with Indus-1 being operational since 1999 and Indus-2 was operational since 2005. Indus-2 is a 2.5 GeV, 200 mA machine, and Indus-1 is a 450 MeV, 125 mA machine. Currently, Indus-2 has 18 operational beamlines, out of which 16 are for users and 2 beamlines are specifically designed for machine diagnostics. Indus-1 has 7 operational beamlines. These beamlines have attracted a large number of users from the Indian academia and industries over the last several years and currently over 950 user experiments of carried out annually with about 175+ publications in peer reviewed international journals from the work carried out at Indus beamlines. Among the operational beamlines, 2 beamlines, namely, Angle Resolved Photo Electron Spectroscopy beamline and X-ray Magnetic Circular Dichroism beamline, are designed and operated on insertion devices, and the remaining beamlines of Indus-2 are designed on bending magnets. 7 more beamlines (out of which 3 are on insertion devices) are in various stages of development. Materials research in general, has been the primary area of interest among the user community at Indus, although in recent years, the protein crystallography community and the Indian pharmaceutical industry has also been using these facilities extensively. Experiments related to projects of national importance like the Indian Space Research Organization's (ISRO) lunar missions, Chandrayaan-1 and Chandrayaan-2 have also been carried out at Indus. In the talk, some of the details of these beamlines and a few important results based on experiments carried out at Indus in the last few years, will be presented.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **35** Type : **Talk (remote)**

Study of the radiation aging of materials with using of beam of the fast neutrons at BINP SB RAS

Thursday, 13 April 2023 17:20 (20)

The BINP SB RAS, in collaboration with Novosibirsk State University, has upgraded facility for boron-neutron capture therapy for the possibility of radiation tests on beam of fast neutrons with the integral flux up to 10^14 neq/cm2.

In 2022 the experiment on the study of the radiation aging of optical fibers for the laser calibration system of electromagnetic calorimeter CMS (CERN, Switzerland) was carried out. The uniqueness of this radiation tests in contrast to irradiation in reactor is the precise control of the level of the accumulated dose with continuous measuring of degradation fiber transparency.

It has been demonstrated for the first time that at the BINP SB RAS it is possible to operate with such doses using of neutron beam. It could be in further used for the wide range of radiation test tasks, related with the development of facilities for HEP.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **36** Type : **Talk (remote)**

Operation experiences of two CPMU at NSRRC

Thursday, 13 April 2023 14:20 (20)

.

Speaker's Name

Jui-Che Huang

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **38** Type : **Talk**

Experiences with new Insertion devices at the Australian Synchrotron

Thursday, 13 April 2023 14:00 (20)

TBC

Speaker's Name

Eugene Tan

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **39** Type : **Talk (remote)**

The recent results on linear accelerator of Siberian Ring Synchrotron Light Source (SKIF)

Thursday, 13 April 2023 16:20 (20)

The 4th generation synchrotron light source is under construction in Budker Institute of Nuclear Physics. The first stage of the linear accelerator is under tests now. The aim of the experiments is to obtain a beam with emittance, charge and energy spread corresponding to the demands of injection into the booster of storage ring. Only one of five accelerating structures is applied in these experiments, and beam energy is reduced to 50 MeV in comparison with complete energy of 200 MeV. The status of the installation and achieved beam parameters are presented.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **40** Type : **Talk (remote)**

Design and Beam Commissioning of Dual Harmonic RF System in CSNS RCS

Thursday, 13 April 2023 16:20 (20)

CSNS was designed with an average power of 100 kW, which was achieved in February 2020 and 125 kW in March 2022. On this basis, CSNS plans to increase the average beam power to 200 kW, which is to double the current strength of the circulating beam of RCS, with the injection energy unchanged. The main means is to add a second harmonic RF cavity to the RCS.

The space charge effect is an important factor to limit the current intensity in high power particle accelerators, especially for low- and middle-energy proton synchrotrons. In order to reduce emittance increase and beam loss caused by space charge effect, CSNS has added a magnetic alloy cavity in 2022 summer to provide a second harmonic RF cavity with harmonic number of 4, and form a dual harmonic RF system together with the original cavity with harmonic number of 2, so as to optimize the longitudinal beam distribution.

This talk will focus on the beam commisioning and simulation results after the installation of magnetic alloy cavity.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG5: Accelerator and its related technologies for hadron (neutron) science

Contribution ID : **41** Type : **Talk**

Particle and Nuclear Physics at the MeV scale in Australia

Thursday, 13 April 2023 14:40 (20)

Recently, the ATOMKI group found evidence for a new fundamental boson, named the X17, observed via p+7Li⟶8Be +(X17⟶(e+e−)), p+3H⟶4He +(X17⟶(e+e−) and)) and p+311B4 +(X17⟶(e+e−)) reactions with a mass of 17 MeV and significance ≈ 7σ. There are now numerous projects to search for weakly coupled bosons, including the X17, using particle physics experiments . However, only the ATOMKI group have utilized nuclear reactions in a competitive way to date.

We intended to employ the Pelletron accelerator in Melbourne to initiate nuclear reactions of the kind: p+ZX⟶Z+1Y +(e+e−) and to build a low mass, high precision Time Projection Chamber, (TPC) with world-first capabilities. The invariant mass resolution of the TPC to the (e+e−) final state is expected to be 0.1 MeV. This provides a substantially more sensitive search for anomalous (e+e−) production than any other experiment and 200 times more sensitivity than ATOMKI. Accordingly, we will either observe the ATOMKI anomaly on the Pelletron or exclude it at very high significance. Following this we propose a program to search for anomalous (e+e−) production with world-leading sensitivity in the 5-25 MeV mass region. In addition, the very large acceptance, and excellent angular and energy resolution of the TPC enables qualitatively more sensitive investigations of Nuclear Internal Pair Conversion decays. This capability enables a range of novel Nuclear Physics investigations.

The presentation will describe the proposed TPC, its expected performance together with its application and anticipated impact in particle and nuclear physics investigations.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **42** Type : **Talk**

Neutron Detector with Ceramic GEM

Thursday, 13 April 2023 17:00 (20)

The GEM detector is useful for various fields, not only high energy physics. One uncomfortable feature is to be broken due to a large discharge. One large charge deposit makes a trigger to lead the large discharge and to carbonize inside the GEM hole. We are developing new GEM foil without carbon to avoid such a bad situation. One good solution is to apply ceramic as an insulator. New ceramic GEM was manufactured with 100 mm × 100 mm size and 100 □m thickness. Also, a neutron detector was constructed with a boron coated cathode to detect neutron for the beam monitor in Born Neutron Capture Therapy (BNCT). The chamber worked fine in the beam test. The results will be shown in the workshop. Now, we are trying to make boron coated GEM to get higher efficiency for the thermal neutron. One new result will be shown, also.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **43** Type : **Talk**

Laser-plasma schemes of narrowband THz emission for THz electron acceleration

Thursday, 13 April 2023 14:20 (20)

One promising method to overcome the vacuum-breakdown limitation in conventional RF-linacs is to use high-frequency fields such as terahertz radiation. To be useful in accelerators, narrowband sources of THz emission are preferable since they can focus more energy into the desired band that fits the accelerating tube. However, laser-plasma-based THz schemes currently available are generally wideband and generate only a few-cycle pulses, even though they are efficient at generating strong peak fields. The system efficiency is, therefore, low since only a selected band from the emission is used for acceleration. In this talk, I present several new ideas that can generate quasi-narrowband THz emission from laser-driven plasmas. One idea involves using plasma-dipole-oscillation, which routinely yields a very narrow spectrum of THz with an efficiency of more than 0.1%. Another idea involves concentrating the THz spectrum around the beat frequency of two driving laser pulses. Overall, this talk focuses on the development of more efficient and effective methods for generating narrowband THz emission from laser-driven plasmas, which could potentially improve the efficiency of THz-based accelerators and other applications requiring high-energy terahertz radiation.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **44** Type : **Talk (remote)**

Superconducting magnets developed in BINP: status of works

Wednesday, 12 April 2023 15:20 (20)

Various superconducting magnets are being developed and manufactured in Budker Institute of Nuclear Physics, Novosibirsk.

Major works are focused on insertions devices for the currently built SKIF – new source of synchrotron radiation research. This project demands at least 10 insertion devices including superconducting wigglers and undulators having high magnet and cryogenics parameters. Three superconducting wigglers will be manufactured and tested in 2023.

Two detector magnets for FAIR project, Darmstadt, Germany are manufactured in BINP. One of them is superconducting dipole magnet for CBM detector and the second one is superconducting solenoid for PANDA detector.

The CBM detector will research compressed baryon matter on the FAIR facility, GSI, Darmstadt. The superconducting dipole magnet of this detector provides vertical magnetic field with field integral ~ 1 T*m along a beam length of 1 m. The warm bore distance between the dipole coils is 1.44 m. Maximal magnetic field on the superconducting winding is 3.6 T. The stored energy of the magnet is ~ 5 MJ.

The superconducting solenoid of PANDA detector is designed to provide 1.2 T magnetics field in volume of 3 m of length and 2.0 m of diameter. The iron yoke of this detector has weight of 240 tons; it was manufactured and assembled.

The status of these works will be presented in the session.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **45** Type : **Talk**

The next generation of Scientific Computing at the Australian Synchrotron

Thursday, 13 April 2023 09:40 (20)

The Australian Synchrotron is a division within ANSTO and one of Australia's premier research facilities. It produces powerful beams of light that are used to conduct research in many important areas including health and medical, food, environment, biotechnology, nanotechnology, energy, mining, agriculture, advanced materials and cultural heritage.

After 15 years of uninterrupted operation with the original 10 experimental endstations, called beamlines, the Australian Synchrotron is currently entering an exciting new phase with the addition of 8 new beamlines. This created an opportunity for the Scientific Computing team to redesign the whole software stack from the ground up.

This presentation will take you on a journey of Scientific Computing at the Australian Synchrotron. You will learn how we employ modern, industry standard tools and architectures in a research environment in order to handle the large data throughput of modern detectors and provide the robustness our users expect from us. A particular focus will be on our use of cloud technologies, running on-premise, across our whole stack from hardware control to data processing on GPUs.

Speaker's Name

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **46** Type : **Talk**

Status report from Tokyo Tier-2

Thursday, 13 April 2023 11:40 (20)

The Tokyo Regional Analysis Center, located at the International Center for Elementary Particle Physics (ICEPP) at the University of Tokyo, has provided computing resources to the ATLAS experiment in the Worldwide LHC Computing Grid as a Tier-2 site. We report on our current status and activities, such as the hardware replacement in January 2021.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **47** Type : **Talk**

Status report on KEKCC and Grid systems

Thursday, 13 April 2023 10:00 (20)

The KEK Central Computer System (KEKCC) provides large-scale computer resources, including Grid computing systems, and essential IT services, such as e-mail and web services to support many research activities in KEK. The current status of KEKCC and Grid systems will be reported in this presentation.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **48** Type : **Talk**

Cloud-based grid computing services for the Belle II and ATLAS experiments at the University of Melbourne

Thursday, 13 April 2023 11:20 (20)

The grid storage at Melbourne has been provided by a Disk Pool Manager (DPM) storage system which is now reaching the end of software support this year, as well as the end of the disk lifetimes. Additionally the IBM Jet cluster that provided compute for ATLAS at Melbourne has also had to be turned off due to hardware failures.

Continuing to provide grid storage and compute for the ATLAS and Belle II experiments requires that we move to new solutions; ones that can be supported with minimal manpower and funding by taking advantage of existing resources at Melbourne. At Melbourne the Research Computing Services (RCS) provides scalable common resources across the university faculties, as well as expertise and support. This includes the Melbourne Research Cloud (MRC) using OpenStack, and a separate S3-compatible endpoint powered by a RADOS Gateway (RGW) providing access to a Ceph object store.

Based on experience from the University of Victoria Canada (U. Vic.) we have created a Dynamic Federations project (Dynafed) frontend server on the MRC to provide a WebDAV interface to the S3 endpoint for the Belle II experiment. This model leaves the installation and maintenance of all hardware, the Ceph cluster, and the RADOS Gateway under the control of the RCS team while the grid group maintains the virtual machines handling grid requests. In addition we are investigating the creation of a HTCondor node to submit ATLAS grid jobs to VMs in the MRC, in a comparable way to the Belle II jobs currently being submitted by U. Vic. to our cloud. We describe the implementation details and various challenges for these services in the future.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **49** Type : **Talk**

Genetic Mutation using Small Neutron Source

Thursday, 13 April 2023 16:00 (20)

Fast neutron irradiation gives a higher LET than gamma radiation, making it a very effective approach for mutagenesis and is widely used to create mutants in many plant species. Neutron irradiation is mainly performed using nuclear reactors and, more recently, accelerators, but both are limited to large facilities, and general access to their use is a bottleneck. In this talk, we report the possibility of fast neutron irradiation using a small neutron source, evaluated using particle and heavy ion transport code (PHITS).

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG5: Accelerator and its related technologies for hadron (neutron) science

Contribution ID : **50** Type : **Talk (remote)**

Design, development and deployment of accelerator magnets in RRCAT and future challenges

Thursday, 13 April 2023 14:40 (20)

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **51** Type : **Talk (remote)**

Generation and Application of High Energy Electron Beams and Hard-X-rays from Laser Wakefield Accelerator.

Thursday, 13 April 2023 14:00 (20)

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **52** Type : **Talk (remote)**

Control Software and Networking infrastructure for Indian Synchrotron Radiation Sources: Present and Future

Thursday, 13 April 2023 12:20 (20)

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **53** Type : **Talk**

Laser plasma wakefield accelerators with external injection for soft X-ray free electron laser at PAL-eLABs

Thursday, 13 April 2023 15:00 (20)

TBC

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **54** Type : **Talk (remote)**

Production of the first photo-electron from the RF Photo-cathode electron gun of Delhi Light Source

Thursday, 13 April 2023 16:00 (20)

A compact THz-FEL facility, named as Delhi Light Source (DLS), is being commissioned at Inter University Accelerator Centre (IUAC), New Delhi. The facility consists of RF photocathode electron gun, high power RF system, the nano-second solid state laser system to be replaced soon by the femto-second (fs) Fibre laser system, the Undulator magnet, the Photocathode deposition systems, various electromagnets, the beam transport and the beam diagnostic devices.
The energy of the first photocurrent electron beam produced in 2022 was limited to be ~1.0 MeV as the forward power from the Klystron couldn't be increased beyond 1 MW in absence of a circulator. The long awaited SF6 based circulator was installed in the RF system in July '22 and presently the electron gun has reached a forward power of 5 MW after prolong RF conditioning.
During February '23, the electron beam was transported through the Undulator and the energy of the electron beam was measured to be 4.5 MeV (the maximum target energy is 8 MeV) by using the bending magnet (designed, developed and characterized at Bhabha Atomic Research Centre) when the cavity produced an accelerating field of ~ 65 MV/m at a forward power of ~ 4 MW.
At present, substantial effort is dedicated to perform rigorous RF conditioning of the cavity and to successfully complete the development and commissioning of the femto-second (fs) fiber laser system which is presently being developed at KEK, Japan. It is expected that by the end of this year, the accelerating field of the cavity will reach beyond 100 MV/m and the fs laser system will be installed at IUAC. The Undulator which was already tested and made operational, will be also operated to produce the first THz radiation.
Initiative is taken to develop the experimental groups and to perform experiments by using the electron beam and THz radiation in near future. A few pilot experiments by using electron beam and THz radiation are also being planned.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **55** Type : **Talk**

The Design and Development of the scientific data and software for High Energy Photon Source in China

Thursday, 13 April 2023 12:00 (20)

Recent advances in X-ray beamline technologies, including the advent of very high-brilliance beamlines at next-generation synchrotron sources and advanced detector instrumentation, have led to an exponential increase in the speed of data collection. As a consequence, there is an increasing need for a data analysis platform that can refine and optimize data collection strategies in real time and effectively analyze data in large volumes after the data collection. The increased data volume and rate push the demand for computing resources to the edge of current workstation capabilities. Advanced data management and analysis methods are required to keep up with the anticipated data rates and volumes.
We proposed a software framework and system for the full life cycle of the advanced light source experiment, to address the data challenges at High Energy Photon Source in China. In this talk, we will focus on the data analysis software framework and data management software framework in this system. We will introduce the design of those two frameworks and the scientific software developed based on the frameworks. The future plan will also be introduced.

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Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **56** Type : **Talk**

Perspectives on compact and next-generation particle therapy systems

Wednesday, 12 April 2023 14:00 (20)

Modern particle therapy systems incorporate incredibly advanced (and large!) technologies: from pencil beam scanning (PBS) to gantries, advanced imaging to superconducting magnets, all in the name of high quality – and cost effective – patient treatment. So what changes are needed for the next generation? In this talk I will give an overview of current and future trends in particle therapy accelerator technology, including highlighting some cases where opportunities exist for innovation. I will also introduce the TURBO 'Technology for Ultra Rapid Beam Operation' project at the University of Melbourne, as an illustration of how novel technologies can help overcome existing bottlenecks.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **57** Type : **Talk (remote)**

Focusing and reduction of correlated energy spread of chirped electron beams in passive plasma lens

Wednesday, 12 April 2023 16:40 (20)

For the next generation of the particle accelerators, including laser wakefield acceleration (LWFA), application of plasma based focusing of electron beams is an area of active research. This approach will pave a path for the miniaturization of the beam transportation line in particle accelerators. In the context of LWFA scheme, this approach will open the opportunity to realize an extremely small setups of multi-GeV and bright source of electron beams. We will present numerical results of passive plasma lens of an electron beam via self-consistent and relativistic particle-in-cell (PIC) simulations. The focusing of an electron beam by a passive plasma lens is a non-linear and dynamic process, which strongly depends on the space charge induced evacuation of the plasma electrons in the vicinity of the propagating electron beam. An initially negative energy chirp is essential in suppressing the unwanted growth in the relative energy spread of the electron beam during the passive lensing. A passive plasma element is useful for both a single as well as multi-stage laser wakefield acceleration configuration.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **58** Type : **Talk (remote)**

Accelerator development activity at Variable Energy Cyclotron Centre, Kolkata, India

Thursday, 13 April 2023 12:00 (20)

Variable Energy Cyclotron Centre (VECC) is a R&D unit of the Department of Atomic Energy, Government of India. This Centre is dedicated to carry out frontier research and development in the fields of Accelerator Science & Technology, Nuclear Science (Theoretical and Experimental), Material Science, Computer Science & Technology and in other relevant areas.

VECC has been delivering proton, alpha and heavy ion beams from K130 room temperature cyclotron for users. Recently beam has been extracted successfully from a K500 superconducting cyclotron for the first time. A 30 MeV medical cyclotron has been commissioned and started routine production and delivery of PET isotopes for patients to different hospitals. An ISOL post-accelerator type of RIB facility has been developed with the K130 cyclotron as the primary accelerator. Status of these accelerators and related interesting developments will be presented in this talk.

Speaker's Name

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG5: Accelerator and its related technologies for hadron (neutron) science

Contribution ID : **59** Type : **Talk (remote)**

Simulation studies on the development of an advanced electron/ion accelerator using a laser-plasma interaction in Korea University Sejong Campus

Thursday, 13 April 2023 11:20 (20)

A laser-plasma acceleration, as an innovative technology for a compact accelerator, has been developed for tumor therapy, compact light sources, an injector of a high-energy accelerator, and so on. To overcome the limitations on generating stable, high-quality beams, it is better to perform the simulations with new ideas based on expected mechanism. The accelerating mechanism and/or self-injection condition of a laser wakefield acceleration has been investigated using EPOCH and SMILEI particle-in-cell (PIC) codes for different types of plasmas, such as, a laser-ablated metal plasma and a helium gas plasma. As investigating the ionization effects of different metals, such as, aluminum, copper, and titanium, the structured metallic plasma targets, such as, titanium-layered aluminum plasma target, has been developed to improve the beam quality, for example, bunch charge or energy spread. The simulation study of laser ablation processes using FLASH computational fluid dynamics (CFD) code is underway to find the experimental condition for generating a desired plasma. A laser proton acceleration with different targets and contamination layers has been also investigated. The simulation results will be presented including the comparison between 2D and 3D simulations with EPOCH and SMILEI codes.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **60** Type : **Talk (remote)**

Australia's ion microbeam facility and capability for space and medical applications

Wednesday, 12 April 2023 16:20 (20)

For 35 years, the Centre for Accelerator Science (CAS) of the Australian Nuclear Science and Technology Organisation (ANSTO) is a national state-of-art facility for applied accelerator science, providing world-leading accelerator mass spectrometry (AMS) and ion beam analysis (IBA). Two accelerators 10 MV Van de Graaff ANTARES and 6 MV Pelletron tandem SIRIUS are equipped with 5 sources to accelerate mono-energetic light and heavy ions up to 100 MeV, into 9 different beamlines which serve a large variety of application.

Two beamlines, one on each accelerator, house the unique heavy ion nuclear microprobes (HIMP) in Australia capable to focus the ion beam down to 500 nm spot size. The microprobe lens systems supplied by Oxford Microbeams Ltd consist of a powerful magnetic quadrupole triplet with high focusing power (up to ME/q2=150 MeV amu) and a scanning coil for rapid raster scanning of the beam.

Two vacuum chambers at the end-stations host piezoelectric XYZR micro-manipulators for sample alignment, high resolution telecentric cameras and microscopes for innovative imaging systems and a variety of detectors. To overcome limitations encountered while performing tests in vacuum, an additional "add-on" enclosed ambient chamber was commissioned in 2019 on the ANTARES HIMP, representing the first Australian microbeam facility in air. The so-called external chamber has the following advantages: i) ease of handling the sample with no limits to the dimension of the sample itself, ii) no charging effects in insulating materials, iii) more effective target heat dissipation, iv) sampling is not required, v) reduction in time spent pressurizing and depressurizing, and vi) option to irradiate biological living samples without compromising them.

Both ANTARES and SIRIUS accelerators are available for users from the industry and academia, to perform precision irradiation in several areas such as advanced materials, novel detectors and semiconductors, space radiation effects, radiobiology and medical application for quality assurance.

This talk will describe the CAS accelerator capabilities on the SIRIUS and ANTARES, particularly focusing on the accelerator technologies available for users for space radiation effects testing of electronics, shielding materials, and photovoltaic technologies. The radiation-induced damages testing capabilities on biological samples, and novel detector applicable to space dosimetry and particle therapy quality assurance will be discussed.

This presentation will provide an overview of the advanced capabilities of the CAS accelerators SIRIUS and ANTARES. The focus will be on the accelerator technologies that users can utilize to test the effects of space radiation on various materials, including electronic components, shielding materials, and photovoltaic technologies. Additionally, the presentation will cover the capabilities of the CAS accelerators for testing radiation-induced damages on biological samples and novel detectors for space dosimetry and particle therapy quality assurance purposes.

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **61** Type : **Talk**

Beamline simulations for the University of Melbourne X-LAB

Wednesday, 12 April 2023 16:00 (20)

The University of Melbourne X-band Laboratory for Accelerators and Beams (X-LAB), now actively being commissioned, is to be operating X-band accelerator research laboratory in the southern hemisphere.

In order to leverage the full capability of the X-BOX test stands from CERN, the X-LAB is designing a compact beamline to be built on site based around the use of high gradient X-band (11.9942GHz) accelerating cavities.

This talk will discuss the design process of this beamline, alternative arrangements, and potential user applications.

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **62** Type : **Talk (remote)**

New technique of ion identification in Accelerator Mass Spectrometry using low-pressure TPC with GEM readout

Thursday, 13 April 2023 15:20 (20)

We have developed and successfully tested a low-pressure Time Projection Chamber (TPC) with Gas Electron Multiplier (GEM) readout for Accelerator Mass Spectrometry (AMS).

At AMS in Novosibirsk, there is a problem to separate isobar ions of different chemical elements that have the same atomic mass. The typical example is radioactive isotopes 10Be and 10B that are used to date geological objects at a time scale of one million years. To solve this problem, a new ion identification technique, namely that based on measuring both ion track ranges and ion energies in low-pressure TPCs with GEM readout, has been developed. This technique is proposed to be applied in AMS for dating geological objects, namely for geochronology of Cenozoic era. We developed the TPC with a dedicated thin silicon nitride window for an efficient passage of ions. The TPC characteristics were studied in isobutane at low pressures using alpha particles of different energies. Based on these data and SRIM code simulation, it was shown that it is possible to efficiently separate isobaric boron and beryllium ions at a nominal pressure (50 torr). Based on this technology, a dedicated TPC was made, which is currently installed on the AMS. The latest results will be presented in my report.

Speaker's Name

Andrey Sokolov

Speaker's Title

Dr.

Speaker's Gender

Man

Speaker's Pronouns

He/Him

Speaker's Preferred name (if any)

Andrey

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **63** Type : **not specified**

Discussion

Discussion of trends and developments in this area

Speaker’s Name

Speaker’s Title

Speaker’s Gender

Speaker’s Pronouns

Speaker’s Preferred name (if any)

Session Classification : Room 2 (Conferece Room)

Contribution ID : **64** Type : **Talk**

Development and operation of electronics for the Belle II Central Drift Chamber

Thursday, 13 April 2023 12:00 (20)

Belle II is a precision measurement experiment that aims to explore new physics by precisely measuring the decays of particles such as B, D and τ. The Central Drift Chamber (CDC), one of the detectors, measures the trajectory and determines the momentum of charged particles using its front-end readout module. The detector system has led to many physics results recently, but also revealed operational issues. For example, radiation damage on the CDC modules significantly affected the data acquisition efficiency. In the future, luminosity is expected to increase even further. Therefore, we are working to address the problems with the current modules and to develop new module that are more radiation resistant.
In this talk, I will present the current operational status of the CDC readout module and the upgrade plans.

Speaker's Name

Yu Nakazawa

Speaker's Title

Dr.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

Primary author(s) : NAKAZAWA, Yu

Presenter(s) : NAKAZAWA, Yu

Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **65** Type : **Talk (remote)**

Laser polaraimeter at VEPP-4M

Thursday, 13 April 2023 12:20 (20)

At the VEPP-4M collider with the KEDR detector, precision measurements of the masses and lepton widths of the Y(1S) meson are planned. In this experiment, beam energy calibration will be carried out by the method of resonant depolarization using a laser polarimeter. The essence of the method is to determine the frequency of the resonant depolarization of the beam, which is related to its energy. The beam polarization is measured from the asymmetry of the Compton backscattering of circularly polarized laser photons on vertically polarized electrons. The report is devoted to the description of the laser polarimeter setup.

Speaker's Name

Ivan Nikolaev

Speaker's Title

Dr.

Speaker's Gender

Man

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Presenter(s) : NIKOLAEV, Ivan (Budker Institute of Nuclear Physics)

Session Classification : Room 1 (Laby Theatre)

Track Classification : WG2: Detector technology development

Contribution ID : **66** Type : **Talk (remote)**

Temporal diagnostics on electron bunches from laser wakefield acceleration via single-shot electro-optic spatial decoding

Thursday, 13 April 2023 14:40 (20)

We established electro-optic (EO) sampling techniques adequate for the diagnostics of electron temporal information in laser wakefield acceleration (LWFA). For the investigation of electron timing jitter and injection process, EO spatial decoding on the electron Coulomb field was performed. The spherical wavefront of the Coulomb field and plasma-density-dependent electron emission timing were discovered. For the determination of electron bunch durations, EO spatial decoding on the coherent transition radiation (CTR) produced when electrons passing through a metal foil was conducted. Electron beam timing fluctuation of 7 fs and bunch durations of few tens of femtoseconds had been demonstrated.
This research not only showed the capability of EO sampling serving as a real-time electron temporal diagnostic for laser-driven sources but also demonstrated the ultra-fast nature of laser-driven electron sources for various applications.

Speaker's Name

Kai Huang

Speaker's Title

Dr.

Speaker's Gender

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He/Him

Speaker's Preferred name (if any)

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Science and Technology); Dr KANDO, Masaki (National Institutes for Quantum Science and Technology); Prof. JIN, Zhan (Osaka University); Prof. HOSOKAI, Tomonao (Osaka University)

Presenter(s) : Dr HUANG, Kai (National Institutes for Quantum Science and Technology, Japan)

Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **67** Type : **Talk**

Belle II computing

Wednesday, 12 April 2023 17:00 (20)

The Belle II experiment is an international collaboration of 1000 Physicists which employs the SuperKEKB e+e- collider at the KEK, Laboratory in Tsukuba, Japan. The experiment employs a distributed computing solution to supply the storage and processing power needed to analyse the data acquired by the Belle II detector. This presentation will describe the current status of the Belle II distributed computing solutions

Speaker's Name

Martin Sevior

Speaker's Title

Prof.

Speaker's Gender

Man

Speaker's Pronouns

He/Him

Speaker's Preferred name (if any)

Martin

Primary author(s) : Prof. SEVIOR, Martin (University of Melbourne)

Presenter(s) : Prof. SEVIOR, Martin (University of Melbourne)

Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **68** Type : **Talk (remote)**

Feasibility study of the Polarization control of synchrotron radiation in NSRRC

Thursday, 13 April 2023 15:20 (20)

.Synchrotron radiation (SR) is a unique high-brightness and fully polarized light source. However, typical insertion devices supply only linearly polarized radiation, precluding studies of chiral dynamics and spin structures. To fulfill a strong demand for circularly polarized radiation, an elliptically polarized undulator (EPU) provides the greatest merit flux and thus has become the workhorse in several facilities. NSRRC has also been developing its own EPU. Up to phase II, in total five EPUs have been installed at Taiwan Photon Source (TPS, 3-GeV ring) to serve EUV and soft X-ray user community. For the next generation light source with multi-bend achromat (MBA) lattices, we revisit EPU and study a new structure to solve the problem of reduced photon flux caused by shortened installation length in an MBA lattice. The tight available length in the MBA lattice also caused us to re-evaluate a scheme of rapid polarization switching. A new device composed of an electromagnet (EM) and a permanent magnet (PM), therefore, has been developed to switch rapidly the right- or left-circularly polarized radiation. We present the results of the EPU development in NSRRC and show new researches to meet the needs of the next generation of SR.

Speaker's Name

T. Y. Chung

Speaker's Title

Dr.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

Primary author(s) : Dr CHUNG, T. Y. (NSRRC)

Presenter(s) : Dr CHUNG, T. Y. (NSRRC)

Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG1: Accelerator and its related technologies for photon science

Contribution ID : **69** Type : **Talk**

Bayesian optimization to design a novel x-ray shaping device

Wednesday, 12 April 2023 16:00 (20)

Purpose:

In radiation therapy, x-ray dose must be precisely sculpted to the tumor, while simultaneously avoiding surrounding organs at risk. This requires modulation of x-ray intensity in space and/or time. Typically, this is achieved using a multi leaf collimator (MLC) — a complex mechatronic device comprising over one hundred individually powered tungsten 'leaves' that move in or out of the radiation field as required. Here, an all-electronic x-ray collimation concept with no moving parts is presented, termed "SPHINX": Scanning Pencil-beam High-speed Intensity-modulated X-ray source. SPHINX utilizes a spatially distributed bremsstrahlung target and collimator array in conjunction with magnetic scanning of a high energy electron beam to generate a plurality of small x-ray "beamlets."

Methods:

A parametric simulation environment was developed in Topas Monte Carlo enabling simulation of a SPHINX structure from linac phase space to dose in water tank including transport through scanning magnets. The SPHINX geometry was parameterized with 8 variables, which were optimized using Bayesian optimization. The goal of the optimization was to maximize dose rate for a user input beamlet width without violating physical geometric constraints. Designs for beamlet widths of 5, 7, and 10 mm were generated, with 200 iterations run for each model. For the seven-mm design, a simulation of dose in water for a 50x50 mm square field was carried out, incorporating transport through custom scanning magnets.

Results:

The Dose per charge was 3574, 6351, and 10015 Gy/C for the five, seven, and ten mm models respectively.

Conclusions:

SPHINX designs for user-input beamlet widths were generated using Bayesian Optimisation of topas monte carlo simulations.

Speaker's Name

Brendan Whelan

Speaker's Title

Dr.

Speaker's Gender

Man

Speaker's Pronouns

He/Him

Speaker's Preferred name (if any)

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Presenter(s) : WHELAN, Brendan (University of Sydney)

Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **70** Type : **Talk**

Status of the High Field Accelerator Magnet Program at IHEP-CAS

Wednesday, 12 April 2023 15:00 (20)

High energy proton colliders towards 100 TeV are proposed these years to study the physics beyond the Standard Model. The colliders call for 16-24 Tesla (T) accelerator magnets to bend and focus the particle beams. IHEP-CAS has been engaged in developing high field magnet technology with Nb3Sn and HTS materials from 2014: several model dipoles have been developed with combined common coil configuration, and advanced iron based superconducting (IBS) technology is being promoted in collaboration with IEE-CAS. The highest field of model dipoles reached 12.47 T in two apertures at 4.2 K in 2021. A new model dipole aiming for 16 T in the aperture is under fabrication. The magnet consists of 6 Nb3Sn coils and 4 HTS coils: the Nb3Sn coils with common coil configuration are expected to provide a dipole field of 13~14 T, and the HTS insert coils wound with block configuration and a new type of transposed ReBCO cable are expected to provide a dipole field of 3~4 T with 13-T background field. Moreover, development of high current IBS cables and high field model coils are ongoing: 2 kA IBS transposed cable has been successfully fabricated, and the IBS model coils reached 60 A critical current at 32 T background field. An overview of the high field accelerator magnet program at IHEP-CAS, present progress and the plan for future will be presented.

Speaker's Name

Qingjin XU

Speaker's Title

Prof.

Speaker's Gender

Man

Speaker's Pronouns

He/Him

Speaker's Preferred name (if any)

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Presenter(s) : XU, Qingjin (IHEP-CAS)

Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG7: Cryogenics, cryomodule and superconducting technology for accelerators

Contribution ID : **71** Type : **Talk**

Development of SRF technology at KEK-iCASA

Thursday, 13 April 2023 09:40 (20)

KEK-iCASA has develoed the SRF technology for the accelerators. High gradient SRF accelerator, such as ILC, is one of target. High-Q/high-gradient R&D has performed to improve SRF cavity performance. Beam operation of STF-2 accelerator achieved the ILC specification. Another target is efficient operation of CW SRF accelerator. cERL operation has carried out to realized high current CW operation. Nb3Sn SRF accelerator development is also on-going toward the future compact CW SRF accelerator.

Speaker's Name

Kensei Umemori

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Prof.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

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Session Classification : Room 1 (Laby Theatre)

Track Classification : WG3: Accelerator technologies for industrial & medical applications

Contribution ID : **72** Type : **Talk (remote)**

Recent progress on CEPC Plasma Injector

Thursday, 13 April 2023 12:20 (20)

TBC

Speaker's Name

Dazhang Li

Speaker's Title

Prof.

Speaker's Gender

Prefer not to state

Speaker's Pronouns

Speaker's Preferred name (if any)

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Presenter(s) : Prof. LI, Dazhang (IHEP, CAS)

Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **77** Type : **Talk (remote)**

Studies of beam quality control in plasma accelerators at IHEP

Wednesday, 12 April 2023 17:20 (20)

In the laser or charged beam driven plasma wakefield accelerators (PWAs), the output beam quality control is one of the main topics of recent researches. In this talk, I will firstly show a few novel injection mechanisms that our plasma acceleration group at IHEP recently proposed, which simultaneously improve the energy spread and the beam charge of the output beam. Next, I will present a new modeling of the three-dimensional betatron oscillation of the trailing beams in PWAs and show the long-term effect of the betatron oscillation, which show new effects that have been found for the first time. The new modeling may help to improve the trailing beam quality in long distance and high energy PWAs.

Speaker's Name

Ming Zeng

Speaker's Title

Prof.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

Primary author(s) : ZENG, Ming

Presenter(s) : ZENG, Ming

Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **78** Type : **Talk (remote)**

High-Field Physics Related to LWFA on Dual-Beam Ultrafast High-Power Lasers

Wednesday, 12 April 2023 15:00 (20)

Electron–photon scattering is one of the most fundamental mechanisms in electrodynamics, underlying laboratory and astrophysical sources of high-energy X-rays. After a century of studies, it is only recently that sufficiently high electromagnetic field strengths have been available to experimentally study the nonlinear regime of the scattering in the laboratory. This can act as a new generation of accelerator-based hard X/ɣ-ray sources driven exclusively by laser light. One ultra-high intense CPA laser pulses will act as two means: first used to accelerate electrons by laser driven wake field (LWFA) to hundreds MeV, and second, from split beam or LWFA-leftover energy reflected by plasma mirror, to collide on the electron for the generation of X/ɣ-rays. Such all-laser-driven X/ɣ source have recently been demonstrated to be energetic, tunable, narrow/broad in bandwidth, short pulsed and well collimated. Such characteristics, especially from a compact source, are highly advantageous for numerous advanced X-ray applications. Moreover, the scattering interaction can act a test bed for high-field QED study. Also, preliminary plan of laser wake-field accelerator and radiation source in two high-power laser facilities, 0.5PW in SJTU and 2.5PW in TDLI will be presented, both of the lasers include two independently compressed two beamlines.

Speaker's Name

Wenchao Yan

Speaker's Title

Prof.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

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Presenter(s) : YAN, Wenchao (Shanghai Jiao Tong University)

Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **79** Type : **Talk (remote)**

Proton Accelerator and related technology development at RRCAT

Thursday, 13 April 2023 16:40 (20)

RRCAT is developing pulsed proton accelerators for various applications. Several types of ion sources, LEBT, Beam dump etc have been developed. A 3MeV RFQ at 325 MHz is under development. The subsystems for integration with RFQ are also under development. These will form a part of the front end test stand for testing the low energy part of a future high energy pulsed proton accelerator. RRCAT has also developed 1.3 GHz multicell SCRF cavities and presently engaged in developming 650 MHz five cell SCRF cavities. Status of develoment and recent results are presented.

Speaker's Name

Purushottam Shrivastava

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Mr.

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Man

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He/Him

Speaker's Preferred name (if any)

Purushottam

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Presenter(s) : Mr SHRIVASTAVA, Purushottam (Raja Ramanna Centre for Advanced Technology)

Session Classification : Room 2 (Conferece Room)

Track Classification : WG5: Accelerator and its related technologies for hadron (neutron) science

Contribution ID : **80** Type : **Talk (remote)**

Low Beta 650MHz 5-cell SCRF (LB650) Cavity activities at VECC ,Kolkata and Status Update

Thursday, 13 April 2023 17:00 (20)

In India, DAE laboratories are now actively involved in research and development activities on Superconducting RF (SCRF) cavities and associated technologies for high current, high energy proton linear accelerators, which is essential for development of ADSS and Spallation Neutron Source by DAE and also for the FERMILAB PIP-II Project. These activities are being carried out under Indian institutions- Fermilab collaboration (IIFC). As part of these activities, VECC, Kolkata, has been involved in the design and development of 650 MHz, β=0.61, 5-cell elliptical shape Superconducting RF linac cavity(LB650 cavity). Before fabrication of 5-cell cavity, VECC developed two single cell prototype niobium cavities with the help of electron beam welding facility at IUAC, New Delhi. The cavities have been processed and successfully tested in Vertical Test Cryostat at Fermilab and achieved high accelerating gradient. After the completion of design, fabrication of two 5 -cell LB650 niobium cavities has started. To validate the process of fabrication of 5- cell LB650 niobium cavity, a prototype 5- cell copper LB650 cavity has been developed before the development of 5-cell LB650 niobium cavity. My talk will cover design of LB650 cavity, LB650 cavity development experience, Test results and status update.

Speaker's Name

Sudeshna Seth

Speaker's Title

Ms.

Speaker's Gender

Woman

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Session Classification : Room 2 (Conferece Room)

Track Classification : WG5: Accelerator and its related technologies for hadron (neutron) science

Contribution ID : **81** Type : **Talk**

HEP computing in Korea

Wednesday, 12 April 2023 17:20 (20)

High-energy physics (HEP) has been studied with e-Science for research anytime, anywhere. Since we could not go to on-site accelerator laboratory in the COVID19 era, the research environment of e-Science had a lot of effects on HEP in Korea. In addition, recent big data production requires high-speed data processing and deep learning, Therefore, HEP needs an enormous size of evolving computing. I will introduce the e-Science research environment and evolving computing architecture for HEP research in Korea.

Speaker's Name

Kihyeon Cho

Speaker's Title

Prof.

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Speaker's Preferred name (if any)

Kihyeon

Primary author(s) : CHO, Kihyeon (KISTI)

Presenter(s) : CHO, Kihyeon (KISTI)

Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **82** Type : **Talk**

The computing and networking status at IHEP

Thursday, 13 April 2023 10:20 (20)

The High Energy Physics experiments and facilities in China are producing or will produce huge data, all this data should be stored, processed and shared properly. This talk will give an introduction about the networking and computing status for HEP experiments at IHEP.

Speaker's Name

Qi Fazhi

Speaker's Title

Prof.

Speaker's Gender

Man

Speaker's Pronouns

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Presenter(s) : QI, Fazhi (Institute of High Energy Physics)

Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **83** Type : **Talk (remote)**

High resolution imaging and CT using a table-top ultrafast light source based on the laser wakefield accelerator

Wednesday, 12 April 2023 17:00 (20)

Laser wakefield accelerators (LWFA), first proposed by Tajima and Dawson in 1979, utilize the plasma wakefield excited by the interaction between ultra-intense ultra-short laser pulses and underdense plasmas to accelerate electrons with an acceleration gradient of >100GV/m. Benefitting from μm-scale dimensions of the plasma wakefield, the electron beams and x-ray sources driven by LWFA are naturally featured few-femtosecond (fs) duration, μm-level transverse size and high brightness. With the intensive development of LWFA in the past two decades, key principles and advanced concepts to generate electron beams with GeVs energy, low emittance and kiloampere peak current have been verified, and phase-contrast imaging, computed tomography and ultrafast x-ray absorption spectroscopy performed with betatron sources and all-optical inverse Compton scattering sources have been demonstrated. These results show that LWFA is capable of becoming a competitive candidate for the next generation compact light sources and electron-positron colliders.

LWFA is sensitive to temperature, humidity and cleanliness. Temperature fluctuation causes mechanical deformation of optomechanical components, resulting in the pointing jitter and quality deterioration of laser beams. Humidity fluctuation and poor cleanliness cause optical surface contamination, even damage the optical mirrors, lenses and crystals. To date, general LWFA systems are almost installed in fixed laboratories or facilities with relatively large scales to meet the operation requirements of a clean environment with constant temperature and humidity. It is still a major challenge for LWFA to operate reliably, steadily and flexibly in a complicated environment for different application scenarios.

Here, we have developed a real table-top LWFA based ultrafast synchrotron radiation source having a size of 1.5m×3m. The apparatus, consisting of an industry level compact 40TW Ti:Sapphire laser (also developed by ourselves) and a compact vacuum system capable of 10Hz repetition frequency, has been proved to have a capacity of continuous and stable operation for a few days. Utilizing the table-top synchrotron radiation source, high resolution images and computed tomography of biological and industrial specimens with a 10μm-level resolution are obtained. Our work paves a way for the application and industrialization of high resolution imaging based on the table-top ultrafast synchrotron radiation source.

Speaker's Name

Bo Guo

Speaker's Title

Dr.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

Primary author(s) : GUO, Bo; MA, Yue; LIU, Dexiang; HUA, Jianfei; LU, Wei

Presenter(s) : GUO, Bo

Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **84** Type : **Talk (remote)**

High efficiency uniform positron acceleration in plasma wakefield accelerator

Thursday, 13 April 2023 15:00 (20)

Next generation high energy electron-positron colliders are highly desirable for precision studies of the Higgs Boson and discovering physics. Current radio-frequency accelerators are limited by the accelerating gradients due to breakdowns, thus advanced acceleration schemes with high gradient, high efficiency are in demand. Plasma wakefield accelerator has achieved several breakthroughs in electron beam acceleration to provide large acceleration gradients and high energy transfer efficiency while maintaining excellent beam quality. However, no equivalent regimes for plasma based positron acceleration has been demonstrated. We investigated several novel positron accelerations regimes using hollow plasma channel or uniform plasma with electron drivers. Through self-consistent and nonlinear interaction of the positron beam and the plasma, stable, high-efficiency and uniform acceleration of the positron beam is realized. 3D Particle-in-Cell simulations show that an several tens of percent energy extraction efficiency from the wake to the positrons and a 1% level energy spread can be simultaneously obtained.

Speaker's Name

Shiyu Zhou

Speaker's Title

Dr.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

Primary author(s) : ZHOU, Shiyu; LU, Wei

Presenter(s) : ZHOU, Shiyu

Session Classification : Room 2 (Conferece Room)

Track Classification : WG4: Innovative accelerator techniques

Contribution ID : **85** Type : **Talk (remote)**

Science Cloud Development in Academia Sinica

Wednesday, 12 April 2023 17:40 (20)

Academia Sinica Grid Computing Centre (ASGC) has become the core facility for big data analysis and scientific computing in Academia Sinica from 2023. Based on WLCG experiences for the past two decades, ASGC is supporting advanced scientific computing of broader disciplines by distributed cloud infrastructure. In this presentation, the development and strategy of science cloud based on WLCG core technologies as well as the collaborations will be shared.

Speaker's Name

Eric Yen

Speaker's Title

Mr.

Speaker's Gender

Man

Speaker's Pronouns

Speaker's Preferred name (if any)

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Presenter(s) : YEN, Eric (Academia Sinica Grid Computing Centre)

Session Classification : Room 3 (Geoff Opat Seminar Room)

Track Classification : WG6: Network & computing

Contribution ID : **86** Type : **not specified**

The Future e+e- Higgs Factory for Asia? - an overview of proposals

Wednesday, 12 April 2023 11:20 (40)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : TAYLOR, Geoffrey (University of Melbourne)

Session Classification : Plenary

Contribution ID : **87** Type : **not specified**

Advanced dosimetry for accelerator based radiation therapy: Overview of development in Australia

Wednesday, 12 April 2023 12:00 (40)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : ROZENFELD, Anatoly (University Of Wollongong , Centre for Medical Radiation Physics)

Session Classification : Plenary

Contribution ID : **88** Type : **not specified**

Status and prospects of KEK research activities

Friday, 14 April 2023 10:00 (40)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : OKADA, Yasuhiro (KEK)

Session Classification : Plenary

Contribution ID : **89** Type : **not specified**

Development of FAIR facility in Germany

Friday, 14 April 2023 10:40 (40)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : CHOLEWA, Marian (University of Rzeszow)

Session Classification : Plenary

Contribution ID : **90** Type : **Talk**

Welcome

Wednesday, 12 April 2023 11:00 (20)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : DOWD, Rohan

Session Classification : Opening/Closing

Contribution ID : **91** Type : **not specified**

WG1 Summary

Friday, 14 April 2023 11:40 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : DOWD, Rohan

Session Classification : MC Summary Talks

Contribution ID : **92** Type : **not specified**

WG2 summary

Friday, 14 April 2023 11:50 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : UNO, Shoji (KEK)

Session Classification : MC Summary Talks

Contribution ID : **93** Type : **not specified**

WG3 Summary

Friday, 14 April 2023 12:00 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : ROZENFELD, Anatoly (University Of Wollongong , Centre for Medical Radiation Physics)

Session Classification : MC Summary Talks

Contribution ID : **94** Type : **not specified**

WG4 Summary

Friday, 14 April 2023 12:10 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : TAN, Eugene

Session Classification : MC Summary Talks

Contribution ID : **95** Type : **not specified**

WG5 Summary

Friday, 14 April 2023 12:20 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : TAN, Eugene

Session Classification : MC Summary Talks

Contribution ID : **96** Type : **not specified**

WG6 Summary

Friday, 14 April 2023 12:30 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : SEVIOR, Martin (University of Melbourne)

Session Classification : MC Summary Talks

Contribution ID : **97** Type : **not specified**

WG7 Summary

Friday, 14 April 2023 12:40 (10)

Speaker's Name

Speaker's Title

Speaker's Gender

Speaker's Pronouns

Speaker's Preferred name (if any)

Presenter(s) : LOBANOV, Nikolai (ANU)

Session Classification : MC Summary Talks