The 8th ACFA-HPPA mini-workshop

Report of Abstracts

https://indico.ibs.re.kr/e/676

Abstract ID : **252**

New painting scheme and upgrade progress for the CSNS injection system

Content

As the CSNS upgrade, CSNS-II will achieve a beam power on the target of 500 kW. The injection energy of the 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 scheme for the CSNS-II has been proposed which has been verified to be feasible and has obvious advantages compared with the traditional bump painting scheme. Secondly, the injection system upgrade will be started in the tunnel in July 2025. At present, various physical design parameters have been determined, and various equipment is under intense processing. In the paper, the progress of the injection system upgrade will be introduced in detail.

Primary author: HUANG, Mingyang (Institute of High Energy Physics, Chinese Academy of Sciences)

Presenter: HUANG, Mingyang (Institute of High Energy Physics, Chinese Academy of Sciences)

Comments:

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Status: SUBMITTED

Submitted by **HUANG, Mingyang** on **Thursday, 4 July 2024**

Abstract ID : **253**

Beam Commissioning Overview: Dual Harmonic RF System at CSNS Rapid Cycling Synchrotron

Content

In this talk, a detailed summary of the key outcomes from the beam commissioning for the dual harmonic rf system at the Rapid Cycling Synchrotron (RCS) of the China Spallation Neutron Source (CSNS) was provided. The summary emphasized the successful enhancement of beam power, achieved through the application of magnetic alloy cavities for longitudinal painting. The primary tasks in beam commissioning were reviewed, concentrating on reducing beam instability and optimizing the longitudinal beam distribution. A series of optimizations were conducted, culminating in a substantial increase in beam power to 160 kW, which exceeds the designed power by 60%. This report also summarizes the significant challenges encountered during the beam commissioning and offers recommendations for future efforts to further increase beam power.

Primary author: LIU, Hanyang (Institute of High Energy Physics Chinese Academy of Sciences)

Co-author: HUANG, Mingyang (Institute of High Energy Physics, Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **LIU, Hanyang** on **Thursday, 4 July 2024**

Abstract ID : **254**

Source of instability in the RCS of CSNS

Content

The Rapid Cycling Synchrotron (RCS) of the China Spallation Neutron Source (CSNS) accumulates protons and accelerates them from 80 MeV to 1.6 GeV at a repetition rate of 25 Hz. The beam power reaches 160 kW, corresponding to the number of 2.5 × 10^{13}. Despite predictions that no instabilities would occur at high beam intensity, an unexpected coherent oscillation of the beam was observed above 50 kW. To confirm the instability, a series of systematic measurements and studies were conducted, revealing that it is a coupled bunch instability and identifying a narrow-band impedance with a low frequency in the RCS. Further bench measurements confirmed that ceramic chambers with RF shields are the source of this impedance. Furthermore, the physical of resonant mechanism has been thoroughly studied and the result is also presented.

Primary author: HUANG, Liangsheng (Institute of High Energy Physics Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **HUANG, Liangsheng** on **Thursday, 4 July 2024**

Abstract ID : **255**

Long life-time RF-driven negative hydrogen ion source and its emittance optimization

Content

The RF-driven H^- ion source has been commissioning in China Spallation Neutron Source (CSNS) for three run cycles. It demonstrates more than 7500 hours life time and almost 100% availability. To fully meet the requirements of CSNS project Phase-II (CSNS-II), the beam intensity should be enhanced and the transverse emittance be minimized. This report covers the recent research and development of the RF-driven H^- source, including the impurities elimination from the hydrogen plasma, the transverse emittance optimization, and space charge compensation in low energy beam transport. These measurements and researches are carried out on a newly constructed test bench.

Primary author: CHEN, Weidong (Institute of high energy physics, Chinese academy of sciences (CAS))

Status: SUBMITTED

Submitted by **CHEN, Weidong** on **Thursday, 4 July 2024**

Abstract ID : **256**

The machine protection system for CSNS accelerator

Content

The China Spallation Neutron Source (CSNS) accelerator consists of an 80MeV H- LINAC, a 1.6GeV Rapid Cycling Synchrotron (RCS), and two beam transport lines. Due to the potential for uncontrolled beam to cause permanent damage to components or generate extremely high levels of residual radiation along the beam line, strong equipment protection measures are required. To address this challenge, the machine protection system for CSNS accelerator comprises two distinct subsystems: the Normal Machine Protection System (NMPS) and the Fast Protection System (FPS).The NMPS, a PLC-based protection system, encompasses two independent systems (NMPS-A and NMPS-B) to ensure redundancy and reliability. The FPS, on the other hand, is a FPGA-based protection system designed to swiftly respond to critical situations, minimizing the risk of damage to accelerator components. The machine protection system for CSNS accelerator has been running stably and reliably for more than 6 years, playing an important role in various stages of CSNS's commissioning and operation, and is one of the important basic conditions for efficient operation of CSNS accelerator.

Primary author: HE, Yongcheng (Institute of High Energy Physics, Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **HE, Yongcheng** on **Friday, 5 July 2024**

Abstract ID : **257**

The Status of CSNS and Its Upgrade Project (CSNS-II)

Content

The China Spallation Neutron Source (CSNS) is a state-of-the-art scientific facility situated in Dongguan, Guangdong Province, China. It offers cutting-edge research tools primarily for the field of material science, utilizing neutron scattering techniques. As the first of its kind in China, the CSNS was completed and commenced user operations in 2018. Following its inauguration, the beam power has been progressively increased, reaching 160 kW by February this year—60% above the initial design target. The second phase of the CSNS project (CSNS-II) has received approval and officially commenced in January this year. This report will provide an overview of the operational status and user accessibility of the CSNS, as well as outline the construction plans and future operational strategies for CSNS-II.

Primary author: WANG, Sheng (Institute of High Energy Physics, Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **WANG, Sheng** on **Monday, 8 July 2024**

Abstract ID : **258**

The Power Supply System for CSNS

Content

This report will introduce various power technologies used in China's spallation neutron source power supply system, including the high-order harmonic vector control technology based on full-digital control module, and harmonically compensated for highly saturated dynamic dipole and quadrupole magnetic fields. the tracking error of dynamic magnetic field is better than 0.1%; adopts multiple solid-state switch series, narrow pulse synchronous drive technology to realize bidirectional extraction of the ion source beam; the nanosecond-cut beam power supply technology can need the beam current structure to reduce beam loss from the Linac to the RCS; the output pulse current is 18kA, and the tracking accuracy is better than 2% of the programmable injection pulse power supply.

Primary author: 齐, 欣 (中国科学院高能物理研究所)

Status: SUBMITTED

Submitted by 齐, 欣 on **Monday, 15 July 2024**

Abstract ID : **259**

CSNS-II LINAC energy upgrade

Content

The CSNS power upgrade project (CSNS-II) will increase the proton beam power from 100 to 500kW, along with the new construction of 9 neutron instruments, 1 Muon end station, and 1 proton end station. To achieve this, CSNS-II will employ superconducting accelerator structures to boost the linac energy from 80 MeV to 300 MeV. Significant progress has been made in the pre-research on key technologies. The critical RF ion source is already operational, and the 648 MHz klystron is currently undergoing high-power testing. Prototypes for the dual-spoke and 6-cell elliptical superconducting cavities, along with their respective cryomodules, have been designed and are in the processing stage. This paper provides a detailed summary of these developments.

Primary author: LIU, Huachang

Status: SUBMITTED

Submitted by **LIU, Huachang** on **Tuesday, 16 July 2024**

Abstract ID : **260**

High-intensity operation of J-PARC Main Ring

Content

The main ring (MR) of Japan Proton Accelerator Research Complex (J-PARC) is a proton synchrotron providing high-power and high-intensity beams to neutrino and hadron experiments. The originally designed beam power was 750 kW in the MR. After long-term shutdown for faster cycling, we performed continuous 800 kW neutrino operation in June this year. In this talk, we will present the keys to achieve 750 kW operation and the strategies to realize the newly set target of 1.3 MW operation.

Primary author: Dr YASUI, Takaaki (KEK)

Status: SUBMITTED

Submitted by **Dr YASUI, Takaaki** on **Tuesday, 16 July 2024**

Abstract ID : **261**

Design, Fabrication, Assembling and Testing of QWR/HWR Cryomodules for HIAF Project

Content

The QWR/HWR cavity cryomodules have been designed for High Intensity heavy-ion Accelerator Facility (HIAF) at the Institute of Modern Physics (IMP) of the Chinese Academy of Science (CAS). There are 17 cryomodules operating at 2K&3130Pa of HIAF linac, which consist of 6 QWR007 cryomodules and 11 HWR015 cryomodules, respectively. These cryomodules are being processed in the vendor currently. And the first cryomodule has completed horizontal testing in July 2024. This paper will report the design, fabrication, assembling and testing of the cryomodule for HIAF project.

Primary author: BAI, FENG (Institute of Modern Physics,Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **BAI, FENG** on **Monday, 29 July 2024**

Abstract ID : **262**

Study on the random resonance for further beam power ramp-up in J-PARC RCS

Content

Study on the random resonance for further beam power ramp-up in J-PARC RCS

Kunihiro Kojima, Hiroyuki Harada, Motoki Chimura, P.K. Saha
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We have realized a design output beam power of 1 MW of the 3-GeV rapid cycling synchrotron (RCS) in the Japan Proton Accelerator Research Complex (J-PARC), and now we are proceeding further beam power ramp-up aiming at an output beam power beyond the design. In MW-class high-power proton machines such as the RCS, the beam loss will produce high levels of radioactivity and limit the available beam power. While the current beam loss is successfully reduced to the order of 0.1% at the designed beam power, further beam loss mitigation prepared for the beam power ramp-up is required. For this purpose, we conducted a series of low-intensity beam tests to investigate the lattice imperfection of the RCS. It was confirmed that the half-integer random resonance was significantly excited and was able to be compensated by the proper addition of the quadrupole field using the trim quadrupole magnets. In addition, the effect of the resonance compensation was verified in the high-intensity beam tests.

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Status: SUBMITTED

Submitted by **KOJIMA, Kunihiro** on **Monday, 29 July 2024**

Abstract ID : **263**

High-intensity beyond 1 MW beam operation with minimum beam loss at J-PARC RCS

Content

In the 3-GeV RCS (Rapid Cycling Synchrotron) of J-PARC (Japan Proton Accelerator Research Complex) we have achieved a routine operation at a designed beam power of 1 MW by minimizing the beam losses and the machine activation as well. We are also preparing to realize far beyond 1 MW due to change of the beam sharing at the downstream facilities as well as for beam sharing to a 2nd neutron production target station currently under designed. We have done some simulation and experimental studied aiming for achieving a minimum beam loss even at beam power beyond the designed 1 MW.

Primary author: SAHA, Pranab (Japan Proton Accelerator Research Complex)

Comments:

This presentation is on behalf of the RCS beam commissioning team

Status: SUBMITTED

Submitted by **SAHA, Pranab** on **Monday, 29 July 2024**

Abstract ID : **264**

Online Control of CAFe II based on Reinforcement Learning

Content

Xiaolong Chen (Institute of modern physics, Chinese Academy of Science)
Zhijun Wang (Institute of modern physics, Chinese Academy of Science)
Yuan He (Institute of modern physics, Chinese Academy of Science)
Xin Qi (Institute of modern physics, Chinese Academy of Science)

Particle accelerators play a critical role in modern scientific research. However, existing manual beam control methods heavily rely on experienced operators, leading to significant time consumption and potential challenges in managing next-generation accelerators characterized by higher beam currents and stronger nonlinear properties. In this contribution, we demonstrate an approach to realize a robust reinforcement learning algorithm-based beam controller at the China Accelerator Facility for Superheavy Elements (CAFe II). Firstly, we verified the necessity of using historical time series of beam diagnostic data in the simulation environment. A dynamic foundation is established that guarantees dynamic controllability for a class of scientific instruments whose dynamics are described by spatiotemporal equations of motion, even though only partial variables are available under steady states. Secondly, we provide a scheme to realize an effective controller based on reinforcement learning, which learns a control policy in the simulation environment and then applies it directly to the real accelerator without further training. Finally, we demonstrate that both a module-by-module approach and a global control approach are used in the orbit correction task in the superconducting section of CAFe II. The global control approach successfully manages up to 42 degrees of freedom. These controllers are now regularly used in the beam commissioning process at CAFe II, significantly improving operational efficiency. Notably, the controllers demonstrate significant robustness, effectively managing beams with diverse charge-to-mass ratios without requiring retraining. This method provides a promising approach to realizing effective control in the particle accelerator community.

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Primary author: CHEN, Xiaolong (Institute of modern physics, Chinese Academy of Science.)

Status: SUBMITTED

Submitted by **CHEN, Xiaolong** on **Monday, 29 July 2024**

Abstract ID : **265**

Development of Solid-state Amplifier for Accelerator Project Based on the New Concept and Technologies in IMP

Content

The Institute of Modern Physics (IMP) of the Chinese Academy of Sciences is the first scientific research unit in China to fully apply solid-state power source (SSPA) to linear accelerator engineering projects since the launch of the ADS project in 2011. This design has since been adopted for two large-scale scientific facilities in Guangdong Province: China initiative Accelerator Driven System (CiADS) and High Intensity Heavy-ion Accelerator Facility (HIAF). In a recent decade of accelerators project construction,IMP has accumulated valuable experience in SSPA design build and operation during the operation and upgrade of several projects which meet the stringent system requirements: high performance, low cost, high scalability, high reliability, and ease of maintenance need. New designs and technologies have been developed for this accelerator solution, such as high-performance power amplifier materials, the “hot swap” concept, special combiners, and new methods for long-term stable operation and on-site maintenance, especially for processing failures without interrupting RF power.

Primary author: SUN, LIEPENG

Status: SUBMITTED

Submitted by **SUN, LIEPENG** on **Tuesday, 30 July 2024**

Abstract ID : **266**

Low beta superconducting cavity system for HIAF iLinac

Content

A superconducting ion-Linac (iLinac), which is supposed to work as the injector in the High Intensity heavy-ion Accelerator Facility project, is under development at the Institute of Modern Physics (IMP), Chinese Academy of Sciences. The iLinac is a superconducting heavy ion linear accelerator approximately 100 meters long and contains 96 superconducting cavities in two types of 17 cyromodules. Two types of superconducting resonators (quarter-wave resonators with a frequency of 81.25 MHz and an optimal beta $\beta = v/c = 0.07$ called QWR007 and half-wave resonators with a frequency of 162.5 MHz and an optimal beta $\beta = 0.15$ called HWR015) have been investigated. The cavity design included extensive multi-parameter electromagnetic simulations and mechanical analysis, and its test results of prototypes are described in this talk. The fundamental power coupler and cavity dynamic tuner designs are also presented in this presentation.

Primary author: JIANG, Tiancai (Institute of modern physics, Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **JIANG, Tiancai** on **Tuesday, 30 July 2024**

Abstract ID : **267**

Study on high availability method of high power superconducting linac based on CAFe

Content

High availability is a crucial performance indicator for accelerator applications. In response to the demand for high availability, the CiADS superconducting linac has conducted systematic research from four aspects: physical design, component failure compensation, rapid beam recovery, and high-reliability design of critical hardware. Firstly, the focus is on extremely low beam loss control in the physical design aspect. Secondly, research into the physics and strategies of rapid component failure compensation has been carried out, with corresponding failure compensation experiments conducted on the CAFe accelerator. Thirdly, analyses and research on rapid beam recovery methods have been conducted for high-frequency, short-duration faults, and these methods have been verified on the CAFe superconducting linac, achieving automatic recovery for 80% of faults within 10 seconds, resulting in a beam availability of 93%. Lastly, a modular approach has been adopted for critical equipment to enhance their reliability and availability. This article will delve into the research results for high availability of superconducting linac based on these four aspects mentioned above in detail.

Primary author: LIU, Shuhui (Institute of Modern Physics , Chinese Academy of Sciences)

Status: SUBMITTED

Submitted by **LIU, Shuhui** on **Tuesday, 30 July 2024**

Abstract ID : **268**

High intensity operation of J-PARC accelerators and future upgrades

Content

The J-PARC accelerator comprises an injector linac, a 3 GeV Rapid-Cycling Synchrotron (RCS) and a Main Ring Synchrotron (MR). To realize the nominal performance of 1 MW at RCS and 0.75 MW at MR, the linac energy and current have upgraded by adding an annular-ring coupled structure linac and by replacing a new frontend at 2013 and 2014, respectively. Since Oct. 2018, the linac provides a nominal peak current of 50-mA beam at an energy of 400 MeV to RCS. In the RCS, the beam power has been gradually increased while continuing the beam loss mitigation study. In April 2024, the beam power of 950 kW has been successfully delivered to the neutron target. With the results of the extensive modification, the MR FX-cycle was shortened from 2.48 s to 1.36 s. And the highest beam power of 760 kW was delivered to neutrino target in Dec. 2023. For SX operation, the beam power was also increased from 65 kW to 80 kW successfully. The recent operation status of the accelerator and the possibility for further upgrade will be presented.

Primary author: MORISHITA, Takatoshi (J-PARC/JAEA)

Status: SUBMITTED

Submitted by **MORISHITA, Takatoshi** on **Wednesday, 31 July 2024**

Abstract ID : **269**

Dominance of Particle Resonances over Parametric Instabilities in High-Intensity Linear Accelerators

Content

For high-intensity linear accelerators, space-charge halo mechanisms are largely classified into two families: particle resonances and parametric instabilities. The dominance between the fourth-order particle resonance and the envelope instability has been argued and studied. Our studies and previous literatures indicate the dominance of particle resonances over parametric instabilities in high-intensity linear accelerators. Any counter evidence has not been found yet. Furthermore studies indicate that parametric instabilities except the envelope instability are unlikely to be observed in actual linear accelerators unless waterbag or KV distributions are generated. We propose a way to overcome the previous design rule to avoid the zero-current phase advance \sigma_o > 90° for the high-intensity linac. The interplay is presented of the envelope instability and the fourth-order parametric instability.

Primary authors: JEON, Dong-O (Institute for Basic Science); JANG, Ji-Ho (RISP/IBS)

Status: SUBMITTED

Submitted by **JEON, Dong-O** on **Wednesday, 28 August 2024**

Abstract ID : **270**

Design study of a high-current K100 compact cyclotron for H2+ acceleration

Content

Magnetic design and beam optics studies have been carried out for a high-current K100 cyclotron, which can accelerate Q/A=1/2 ions such as H2+ to the energy of 25 MeV/u. Since proton acceleration using H2+ instead of H+ or H- can double the maximum beam current limited by space charge effects at the injection energy of compact cyclotron, we expect a maximum current of over 2 mA achievable. In addition, d+, He2+ can be accelerated with slight adjustments of rf frequency so as to produce fast neutrons and medical isotopes such 211At for advanced cancer therapy, respectively. It is important to extract high-current positive ions at an efficiency of over 99 % to avoid serious radiation contamination. Beam optics simulations performed show a sufficient last-turn separation attainable by adopting four cavities with a help of orbital precession by controlling the first harmonic coils in the extraction region. The beam can be extracted by using either electrostatic deflector or so-called self-extraction method, which don't use active component. I will present overall design of the compact K100 cyclotron for high-current operation.

Primary author: KIM, Jongwon (RISP/IBS)

Status: SUBMITTED

Submitted by **KIM, Jongwon** on **Friday, 30 August 2024**

Abstract ID : **271**

Beam Commissioning Results of the RAON Superconducting Linac with argon beams

Content

The low energy part of the superconducting linac in IRIS (institute of rare-isotope science) consists of two different types of superconducting cavities, QWR (quarter wave resonator) and HWR (half wave resonator). There are 22 QWR cryomodules where each module has a QWR cavity. There are 2 different types of cryomodules in the HWR section, HWRA and HWRB. There are 13 HWRA cryomodules where each module has 2 HWR cavities. There are 19 HWRB cryomodules where each module has 4 HWR cavities. For the transverse beam focusing, the quadrupole doublets are installed in the warm sections which are located between cryomodules. We performed the beam commissioning of the superconducting linac with Ar9+ beams in 2023 and with Ar8+ beams in 2024. This work summarized the beam commissioning results of the RAON superconducting linac.

Primary author: JANG, Ji-Ho (RISP/IBS)

Co-authors: CHOI, Chuljin; HEO, Jeongil; JEON, Dong-O (Institute for Basic Science); JANG, Hyojae; JUNG, Yoochul; KIM, Hyung Jin (Institute for Basic Science); KIM, Youngkwon; KIM, Hee-tae; KIM, Juwan; Dr KWON, Jangwon; SEOL, Kyungtae; SON, Hyungjoo

Status: SUBMITTED

Submitted by **JANG, Ji-Ho** on **Sunday, 1 September 2024**

Abstract ID : **272**

KOMAC Linac Status

Content

A 100 MeV proton linear accelerator has been operating at Korea Multi-purpose Accelerator Complex (KOMAC). It supplies proton beam to 4 target rooms and the evaluation of the semiconductor devices by using proton and neutron is the most popular application field. In this paper, we summarize the operation status of the linac and present the upgrade plan.

Primary author: KWON, HYEOK JUNG (KOMAC, KAERI)

Status: SUBMITTED

Submitted by **KWON, HYEOK JUNG** on **Tuesday, 3 September 2024**

Abstract ID : **273**

Beam Test Stand at KOMAC

Content

We have developed a multi-purpose beam test stand (BTS) at KOMAC. The BTS is composed of a 2.45 GHz microwave ion source, two-solenoid LEBT, a 200-MHz RFQ and two beam lines. The ion source and LEBT are basically same as the injector used for the 100-MeV proton linac at KOMAC. The BTS is mainly used for the beam physics study including space charge effect and multi-dimensional phase space diagnostics. In addition, we have performed various accelerator hardware study such as LLRF development and control system development by using a compact accelerator system of BTS. The details of the BTS development and R&D activities using BTS will be given in this talk.

Primary author: KIM, HAN SUNG (KOMAC, KAERI)

Comments:

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Status: SUBMITTED

Submitted by **KIM, HAN SUNG** on **Tuesday, 3 September 2024**

Abstract ID : **274**

Fast neutron experimental system at RAON

Content

A fast neutron experimental system, called the Nuclear Data Production System (NDPS), has been constructed at RAON (Rare Isotope Accelerator complex for ON-line experiments) in Korea. NDPS provides neutron beams not only for nuclear data measurements but also for other purposes. It is designed to produce both white and mono-energetic neutrons, utilizing a 98 MeV deuteron beam and 20–83 MeV proton beams with thick graphite and thin lithium targets, respectively. Fast neutrons are generated in the target room and guided to the Time-of-Flight room via a 4-meter-long neutron collimator composed of iron and 5% borated polyethylene.
The first neutron beam was generated by bombarding ~16 MeV/u $^{40}Ar^{18+}$ ion beams into the thick graphite target instead of proton or deuteron beams. Neutron detectors were installed to measure the neutron flux and the neutron beam profile in the first beam test. This presentation will provide an overview of NDPS, along with its current status.

Primary authors: HAM, Cheolmin (Institute for Rare Isotope Science); LEE, CheongSoo (IBS); OH, Geonhee (Institute for Rare Isotope Science (IRIS), Institute for Basic Science (IBS)); LEE, Kwang-Bok (RISP); KIM, Jaesung (Institute for Basic Science); KWAK, Donghyun; SON, CHANGWOOK (Institute for Basic Science); KIM, Dong Geon (Hanyang University); KIM, Eunhee (Institute for Basic Science); KIM, Jae Cheon (IBS); KIM, Mijung (RISP/IBS); Dr KWAG, Minsik (IRIS, IBS); LEE, Sangjin (IBS); PYEUN, Seong Jae (RISP, IBS); GIL, Danhye (IBS); BAEK, Beomyeol (Institute for Basic Science); HONG, IN-SEOK (IBS); STUHL, Laszlo (CENS, IBS); KORKULU, Zeren (IBS, CENS); PEREIRA-LOPEZ, Xesus (Center for Exotic Nuclear Studies (CENS), Institute for Basic Science (IBS)); HA, Jeongsu (CENS, IBS); HUH, Jangyong (CENS (Center for Exotic Nuclear Studies), IBS (Institute of Basic Science)); KIM, Sunji (Institute for Basic Science); KIM, Dahee (Center for exotic nuclear studies, Institute Basic Science); SON, Yonghyun (Seoul National University); KIM, Yung Hee (CENS); Prof. CHOI, Seonho (Seoul National University); LEE, Youngouk (KAERI); SHIN, Taeksu; TSHOO, Kyoungho (RISP/IBS); Dr CHAVAN, Vivek (IBS); Dr MUKHERJEE, Arunita (IBS)

Presenter: HAM, Cheolmin (Institute for Rare Isotope Science)

Status: SUBMITTED

Submitted by **HAM, Cheolmin** on **Monday, 9 September 2024**

Abstract ID : **282**

Commissioning Status of Cyclotron at RAON

Content

At the RAON facility, the Isotope Separation On-Line (ISOL) system has been developed, and tests of rare isotope (RI) beam production using a 70-MeV cyclotron have been conducted. In this talk, we present the characteristics extracted from the cyclotron's SAT process and describe the isotope production process in conjunction with the ISOL system. A 50 kW beam test was performed with the cyclotron, and the characteristics of the proton beam at the ISOL target location were measured. Following successful proton beam transport to the ISOL target, operational optimizations for isotope production were achieved. A 70 MeV, 11 μA proton beam was used to produce the Na-25 isotope, which was subsequently accelerated in SCL3.

Primary author: YEON, Yeong Heum

Co-authors: Dr HEO, Seongjin (IBS); YIM, Hee-Joong (IBS); Dr YOO, Kyounghun (IRIS / IBS); HWANG, Wonjoo (Rare Isotope Science Project); JEONG, Jaewon; HAASHIMOTO, Takashi (Institute for Basic Science, Rare Isotope Science Project); PARK, Dong Joon (IBS); MOON, Jun Young (Institute for basic science); Dr HA-NA, Kim (IBS); NAM, Shinwoo (IBS); KIM, Jongwon (RISP/IBS); LEE, Jinho

Presenter: YEON, Yeong Heum

Status: SUBMITTED

Submitted by **YEON, Yeong Heum** on **Thursday, 19 September 2024**