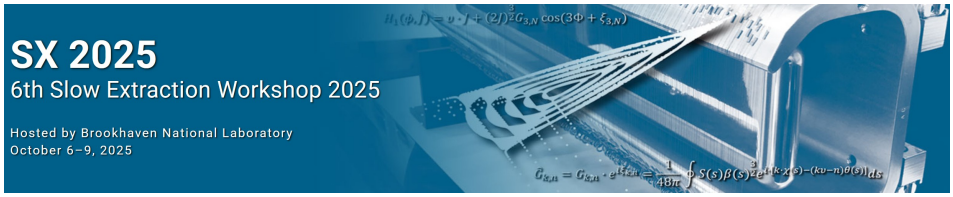
6th Slow Extraction Workshop (SX 2025)



Report of Contributions

https://indico.bnl.gov/e/sx-workshop2025

Contribution ID: **10** Type: **Poster**

The ”tunemod” lattice element for tune modulation studies

Tune modulation is dangerous to stability and clean operation when RF buckets and longitudinal motion are active. The “tunemod” lattice element enables the effectes of tune modulation to be evaluated, in the absence of other effects due to longitudinal motion, such as dispersion-dependent and parametric strength effects. Examples are presented.

Author: PEGGS, Stephen (BNL)

Co-author: Dr SATOGATA, Todd (Thomas Jefferson National Accelerator Facility)

Presenter: PEGGS, Stephen (BNL)

Contribution ID: **20** Type: **Poster**

Test and final design of the Cryogenic Current Comparator for slow extraction

The Cryogenic Current Comparator (CCC) is a superconducting device for measurement of low intensity beams with magnetic fields in the range of fT. It uses a Superconducting Quantum Interference Device (SQUID) as an ultrasensitive magnetometer and an elaborated superconducting shield for its protection from external magnetic fields. The system is operated in a helium bath cryostat, which has to fulfil many requirements, such as being non-magnetic, pressure/temperature stable (mK), vibration dampening, UHV fit, bakeable, compact and accessible for maintenance and repair. The nA current resolution at required bandwidth as well as stand-alone operation of the cryogenic system could recently be demonstrated, which allows for a provisional conclusion of CCC development for FAIR. In this contribution we present the final design of the FAIR-CCC, showing our latest results from measurements of slow extracted beams in the SIS18 extraction line. Our solutions for filtering of periodic disturbances will be presented as well as design considerations and new results from our cryostat.

Author: SIEBER, Thomas (GSI Darmstadt)

Co-authors: KATHRI, Gunn (CERN); TAN, Jocelyn (CERN); CRESCIMBENI, Lorenzo (FSU Jena); SCHWICKERT, Marcus (GSI); FORCK, Peter (Beam Instrumentation and advanced operation); STÖHLKER, Thomas (GSI, HiJ and FSU Jena); TYMPEL, Volker (HIJ); ZAKOSARENKO, Vyacheslav (IPHT Jena and Supracon)

Presenter: FORCK, Peter (Beam Instrumentation and advanced operation)

Contribution ID: **24** Type: **Poster**

Rastering vs nonlinear optics for ion irradiation applications

Ion beam irradiation of integrated circuits is important for space and aerospace applications. It is important to irradiate specified areas of a target with a well-defined dose. The present state of the art is to transform the transverse ion beam distribution from Gaussian to a uniformly-filled shape that is large enough to fill the slit of a tungsten collimator. Uniform transverse density distributions are also important in spallation applications. We will present a comparison of two approaches that can remove the collimator, offering a cleaner, more flexible and more accurate irradiation facility. An approximately uniform particle flux can be achieved over arbitrary rectangular domains by rastering the Gaussian beam in two dimensions. An alternative approach is to use nonlinear optics – typically placing two octupole magnets (optionally with duodecapole field components) in the beamline [2]. We will present a systematic comparison of these two approaches for a proposed irradiation facility. The possibility of machine learning based automation will be considered.

Author: BRUHWILER, David (RadiaSoft LLC)

Co-authors: HOFFSTAETTER, Georg (Cornell University); EDELEN, Jonathan (RadiaSoft LLC); BROWN, Kevin (C-AD)

Presenter: BRUHWILER, David (RadiaSoft LLC)

Contribution ID: **25** Type: **Poster**

Simulations of an AC Quadrupole for Power-line Ripple Correction at the AGS Booster

The AGS Booster delivers slow-extracted beam to the NASA Space Radiation
Laboratory by exciting a third integer resonance with. To correct oscillations of the orbit from the power-line ripple, an active filter on the main magnet power supply. This corrects the ripple in the dipoles and four of five windings in the quadrupoles. To correct residual ripple on the quadrupoles, a corrector quadrupole has been installed and connected to an AC circuit to drive the quadrupole at the frequency of the observed ripple. Simulations of the effects of power-line ripple on the quadrupoles are shown, with and without the AC quadrupole corrector, and their effects on the dynamics of slow extracted beam.

Author: HOCK, Kiel (Brookhaven National Laboratory)

Co-authors: MARNERIS, Ioannis (BNL); BROWN, Kevin (C-AD); SCHOEFER, Vincent (CAD)

Presenter: HOCK, Kiel (Brookhaven National Laboratory)

Contribution ID: **28** Type: **not specified**

Status of the SX commissioning for the Mu2e experiment

Monday 6 October 2025 09:30 (30 minutes)

Presenter: NAGASLAEV, Vladimir (Fermilab)

Contribution ID: **29** Type: **not specified**

HEARTS@LEIR for R2E testing at CERN

Monday 6 October 2025 10:30 (30 minutes)

Presenter: CORTES, Cristopher (CERN)

Contribution ID: **30** Type: **not specified**

Slow extraction of mixed ion beams

Monday 6 October 2025 11:00 (30 minutes)

Author: RENNER, Elisabeth (TU Wien)

Co-author: ONDREKA, David (GSI Helmholtzzentrum für Schwerionenforschung)

Presenters: ONDREKA, David (GSI Helmholtzzentrum für Schwerionenforschung); RENNER, Elisabeth (TU Wien)

Contribution ID: **31** Type: **not specified**

Less ripple - higher intensity: What is the ”ideal” intensity in SX for raster-scanning at HIT?

Monday 6 October 2025 11:30 (30 minutes)

Presenter: SCHÖMERS, Christian (HIT)

Contribution ID: **32** Type: **not specified**

Slow extraction system and beam commissioning for compact application facilities

Presenter: RUAN, Shuang (Institute of Modern Physics, Chinese Academy of Sciences)

Contribution ID: **33** Type: **not specified**

Simulating the space radiation environment with accelerators

Monday 6 October 2025 13:30 (30 minutes)

Presenter: BROWN, Kevin (C-AD)

Contribution ID: **34** Type: **not specified**

Slow extraction simulations with SciBmad

Monday 6 October 2025 13:00 (30 minutes)

Presenter: HAMWI, Eiad (Cornell University)

Contribution ID: **35** Type: **not specified**

Stable islands and bent crystals for slow extraction

Monday 6 October 2025 14:00 (30 minutes)

Presenter: GIOVANNOZZI, Massimo (CERN)

Contribution ID: **36** Type: **not specified**

Octupole assited slow extraction from SPS to the North Area at CERN

Monday 6 October 2025 15:30 (30 minutes)

Presenter: GORN, Aleksandr (CERN)

Contribution ID: **37** Type: **not specified**

Crystals and beam diffusers for higher extraction efficiency at J-PARC

Monday 6 October 2025 16:00 (30 minutes)

Presenter: MUTO, Ryotaro (KEK)

Contribution ID: **38** Type: **not specified**

Development of SX schemes for SIS100 in the presence of higher-order field errors

Monday 6 October 2025 16:30 (30 minutes)

Presenter: ONDREKA, David (GSI Helmholtzzentrum für Schwerionenforschung)

Contribution ID: **39** Type: **not specified**

SPS Crystal shadowing advancment and operational deployment

Monday 6 October 2025 17:00 (30 minutes)

Presenter: VELOTTI, Francesco Maria (CERN)

Contribution ID: **40** Type: **not specified**

Investigations into multi energy extraction at MedAustron

Tuesday 7 October 2025 11:00 (30 minutes)

MedAustron, located in Wiener Neustadt, Austria, is a synchrotron facility used for medical treatment and research. To decrease downtime and increase the efficiency of the machine, multi energy extraction (MEE) techniques are explored. An alternative extraction method to the present betatron core driven extraction is radio frequency knock out (RFKO). This method allows for extracting bunched beams, thus enabling re-acceleration or deceleration without recapturing the particles after partial extraction. This contribution presents MEE studies using the RFKO extraction method through measurements and simulations with Xsuite, exploring energy changes in both upwards and downwards mode. Of particular interest are the effects of the energy change on the longitudinal phase space distribution and the resulting spill behavior. The influence of main dipole ramp rates and RF parameters, such as voltage, on the longitudinal phase space distribution is characterized through longitudinal tomography.

Presenter: HOLZFEIND, Katrin

Contribution ID: **41** Type: **not specified**

Studies on collective phenomena related to slow beam extraction

Tuesday 7 October 2025 09:00 (30 minutes)

Presenter: TOMIZAWA, Masahito (J-PARC)

Contribution ID: **42** Type: **not specified**

Design of a resonant slow extraction from low-emittance electron booster rings using transverse resonance island buckets

Tuesday 7 October 2025 09:30 (30 minutes)

Presenter: CORTES, Cristopher (CERN)

Contribution ID: **43** Type: **not specified**

Crystal extraction studies at SPS

Tuesday 7 October 2025 15:30 (30 minutes)

Presenter: DUTHEIL, Yann (BNL)

Contribution ID: **44** Type: **not specified**

Crystal production at CERN

Tuesday 7 October 2025 13:00 (30 minutes)

Presenter: ESPOSITO, Luigi (CERN)

Contribution ID: **45** Type: **not specified**

Realization of extreme sensitive power-supplier AC ripple measurements

Tuesday 7 October 2025 14:00 (30 minutes)

Presenter: STULLE, Frank (Bergoz)

Contribution ID: **46** Type: **not specified**

R&D on low-Z electrostatic septa at CERN

Tuesday 7 October 2025 13:30 (30 minutes)

Presenter: LACKNER, Friedrich (CERN)

Contribution ID: **47** Type: **not specified**

Investigation of channeling with low energy ion beams for medical applications

Presenter: GARATTINI, Marco (INFN)

Contribution ID: **48** Type: **not specified**

Crystal ultra-slow extraction of positrons from the Frascati DAΦNE collider

Presenter: GARATTINI, Marco (INFN)

Contribution ID: **49** Type: **not specified**

RF techniques for spill quality control at CERN

Tuesday 7 October 2025 16:00 (30 minutes)

Presenter: ARRUTIA, Pablo (CERN)

Contribution ID: **50** Type: **not specified**

Tailored multi-band excitation to minimize fluctuations for knock-out extraction

Wednesday 8 October 2025 09:30 (30 minutes)

Presenter: NIEDERMAYER, Philipp (GSI)

Contribution ID: **51** Type: **not specified**

Studies of bunched beam extraction with high harmonics h=90 at SIS18

Wednesday 8 October 2025 09:00 (30 minutes)

Presenter: FORCK, Peter (Beam Instrumentation and advanced operation)

Contribution ID: **52** Type: **not specified**

Application of autoresonance in rapid beam extraction of synchrotrons

Presenter: DING, Xiao (Institute of Modern Physics, Chinese Academy of Sciences)

Contribution ID: **53** Type: **not specified**

Optimization of the slow extraction of SAPT Synchrotron

Presenter: ZHANG, Manzhou (Shanghai APACTRON Particle Equipment Co., Ltd.)

Contribution ID: **54** Type: **not specified**

Studies on spill quality improvement at J-PARC

Wednesday 8 October 2025 11:00 (30 minutes)

Presenter: MUTO, Ryotaro (KEK)

Contribution ID: **55** Type: **not specified**

Spill feedback and optimisation system for RFKO and tune scan extraction

Wednesday 8 October 2025 11:30 (30 minutes)

Presenter: NIEDERMEYER, Philipp

Contribution ID: **56** Type: **not specified**

Extraction bump digital twin for NSRL slow extraction

Wednesday 8 October 2025 13:00 (30 minutes)

Presenter: LIN, Lucy (Brookhaven National Laboratory)

Contribution ID: **57** Type: **not specified**

Status of RF knock-out extraction development at MedAustron

Tuesday 7 October 2025 11:30 (30 minutes)

Presenter: PLASSARD, Fabien (MedAustron)

Contribution ID: **58** Type: **not specified**

Crystal design based on multi-fidelity surrogate models

Wednesday 8 October 2025 13:30 (30 minutes)

Presenter: VELOTTI, Francesco Maria (CERN)

Contribution ID: **59** Type: **not specified**

Operational results with new high frequency spill monitor and prospects

Wednesday 8 October 2025 14:00 (30 minutes)

Presenter: RONCAROLO, Federico

Contribution ID: **60** Type: **not specified**

Precise evaluation of time-varying quadrupole field errors in the J-PARC Main Ring

Wednesday 8 October 2025 15:30 (30 minutes)

Presenter: ASAMI, Takashi (KEK)

Contribution ID: **61** Type: **not specified**

Development of the bent crystals for Slow Extraction

Wednesday 8 October 2025 16:00 (30 minutes)

Presenter: GUIDI, Vincenzo (University of Ferrara)

Contribution ID: **62** Type: **not specified**

OTR based single particle counting for heavy ion beams

Presenter: GHAGI, Rupesh (GSI & Liverpool Univ.)

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

Poincare-friendly tracking with tune modulation

Wednesday 8 October 2025 16:30 (30 minutes)

Presenter: PEGGS, Stephen (BNL)

Contribution ID: **65** Type: **Poster**

Spill Ripple Compensation with direct field ripple measurements

Compensation AC quad has been installed in the AGS Booster at BNL to counteract measured ripples and provide smoother, more stable spills for sensitive experiments. Hardwares to provide digital control have been assembled. Signal processing and control integration is under development.

Author: TAJNE, Shruti (Brookhaven National Laboratory)

Co-authors: HO, Chung (Brookhaven National Laboratory); BAJON, Edward (Brookhaven National Lab); BROWN, Kevin (C-AD); KABIR, Latif (Brookhaven National Lab); COSTANZO, Michael (Brookhaven National Laboratory)

Presenter: TAJNE, Shruti (Brookhaven National Laboratory)

Contribution ID: **66** Type: **Poster**

Practical recipes for Phase Space Reconstruction and Tune Measurements using TBT BPMs

The motivation of this poster is to encourage discussion and the exchange of practical experience among workshop participants on techniques for reconstructing and visualizing key beam dynamics parameters relevant to Slow Extraction. We present the methods applied during the 2025 Slow Extraction commissioning at Fermi lab for tuning the resonant extraction phase based on the beam trajectory in phase space. In addition, we describe the tools developed for precise reconstruction of the rapidly varying machine tune using turn by turn BPM data.

Presenter: NAGASLAEV, Vladimir (Fermilab)

Contribution ID: **67** Type: **not specified**

Session 1 and 2 Summary

Thursday 9 October 2025 08:30 (30 minutes)

Presenters: SCHÖMERS, Christian (HIT); HAMWI, Eiad (Cornell University); VELOTTI, Francesco Maria (CERN); BROWN, Kevin (C-AD); LIN, Lucy (Brookhaven National Laboratory); TOMIZAWA, Masahito (J-PARC); NAGASLAEV, Vladimir (Fermilab); DUTHEIL, Yann (BNL)

Contribution ID: **68** Type: **not specified**

Session 3 and 4 summary

Thursday 9 October 2025 09:00 (30 minutes)

Presenters: MEREGHETTI, Alessio; ONDREKA, David (GSI Helmholtzzentrum für Schwerionenforschung); RENNER, Elisabeth (TU Wien); HOCK, Kiel (Brookhaven National Laboratory); FRASER, Matthew (CERN); ARRUTIA, Pablo (CERN)

Contribution ID: **69** Type: **not specified**

Session 5 and 6 summary

Thursday 9 October 2025 09:30 (30 minutes)

Presenters: NARAYANAN, Aakaash (aakaashn@fnal.gov); CORTES, Cristopher (CERN); FORCK, Peter (Beam Instrumentation and advanced operation); MUTO, Ryotaro (KEK)

Contribution ID: **70** Type: **not specified**

SX2027_Announcement

Thursday 9 October 2025 10:00 (30 minutes)

Presenter: FRASER, Matthew (CERN)