

Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

Real-time Optimization of an Ion Optical Beamline¹ ZACHARY SCHILLACI, MATTHEW AMTHOR, Bucknell University, DAVE MORRISSEY, National Superconducting Cyclotron Laboratory, MAURICIO PORTILLO, Facility for Rare Isotope Beams, STEFAN SCHWARZ, MATHIAS STEINER, CHANDANA SUMITHRARACHCHI, National Superconducting Cyclotron Laboratory — We have developed an experimental approach to automatically adjust multiple electrostatic and/or magnetic elements on an ion optical beamline, while analyzing the profile of the beam on a detector at the image point, until an optimal tune is found. This approach dramatically simplifies beamline tuning, thus allowing more efficient use of experimental equipment; ensures a more optimal tune is found, providing a more focused beam spot without a significant loss of beam transmission; and will allow the development of specialized optical tunes based on the needs of any given experiment. The approach was tested directly on the D-Line at the National Superconducting Cyclotron Laboratory at Michigan State University in several real-time optimization runs. The initial experiments demonstrate the ability of the optimizer to focus the beam while preserving transmission, ultimately halving σ_x and σ_y of the beam spot within a one-hour optimization run relative to that produced through a manual tweak of a model based tune. With further research we plan to generalize the approach to work on any given beamline, including particularly for higher order tunes of fragment separators.

¹NSF REU Grant #PHY-1156964 and NSF Grant #PHY-1102511

Zachary Schillaci
Bucknell University

Date submitted: 01 Aug 2015

Electronic form version 1.4