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Fast beam optics simulation of low-energy beam transport systems with a matrix method ADRIAN VALVERDE, Michigan State University, GEORG BOLLEN, RYAN RINGLE — The Low Energy Beam and Ion Trap (LEBIT) facility at the NSCL utilizes thermalized rare isotope beams produced via projectile fragmentation for high-precision Penning trap mass measurements. Ions are transported between the different components using an electrostatic ion optical system. Optimizing ion transport can be difficult as the parameter space is large and it is not immediately obvious what effect changing a parameter has on the beam. SIMION is a program that provides a very accurate way to model the paths of these ions; however, it can take considerable time, so to quickly calculate the effect of minor adjustments to the potentials, a different method is desirable. Matrix ion optics provides such a method; like in matrix optics for light, matrices are created to model the focusing effect of the elements in the system. A specific method for the modeling of certain electrostatic elements can be found in papers by G.H. Gillespie and T.A. Brown. The purpose of this project was to create an implementation of the matrix methods for einzel lenses and acceleration columns in python, and test the results from the program against those produced by SIMION. Thus far, the comparison between SIMION values and those calculated through this method have shown good agreement; as it provides a good approximation of the actual path, it can be used to predict the path of the beam.

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