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**Optics Simulations for the optimization of the CLAIRE Ion Beam** Extraction and Transport System NAN XU, DAMON TODD, DANIELA LEITNER, Lawrence Berkeley National Lab — CLAIRE (Center for Low Energy Astrophysics and Interdisciplinary REsearch) is a proposed nuclear astrophysics facility under design at the Lawrence Berkeley National Laboratory. The facility will measure cross sections relevant to stellar burning, namely  ${}^{3}\text{He}({}^{4}\text{He},\gamma){}^{7}\text{Be}$ , a reaction which is one of the leading sources of uncertainty when correlating solar neutrino data with theoretical solar models. A beam line concept has been developed to extract and transport a tightly focused (<5mm), high current (100mA), low energy (50keV $\sim$ 300keV) <sup>3</sup>He<sup>+</sup> ion beam to a high density gas jet target. The beam is first extracted from a plasma ion source, and is then focused by two solenoid lenses mounted on a 300kV high voltage (HV) platform. The envelope of the accelerated beam leaving the HV platform is kept as small as possible by another lens before going through a  $60^{\circ}$  analyzing magnet. The last focusing solenoid lens produces the desired beam size on the target. An extensive simulation program was employed to optimize the extraction and the transport of the beam over the desired energy range. The detailed analysis of this simulation will be shown and discussed.

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