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Title

1-MeV electrostatic ion energy analyzer

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Publication Date

2004-12-01

PAC05 Abstract

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Title 1-MeV Electrostatic Ion Energy Analyzer

Submitted 11/30/04 10:59 AM

Classification Instrumentation

Modified 12/01/04 10:27 AM

Session

Presentation Poster

Presenter Frank Bieniosek

Paper ID

Paper PDF [Download](#)

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Abstract We describe a high resolution (a few $\times 10^{-4}$) 90-degree cylindrical electrostatic energy analyzer for 1-MeV (singly ionized) heavy ions for experiments in the Heavy Ion Fusion Virtual National Laboratory. By adding a stripping cell, the energy reach of the analyzer is extended to 2 MeV. This analyzer has high dispersion in a first-order focus with bipolar deflection-plate voltages in the range of ± 50 kV. We will present 2- and 3-D calculations of vacuum-field beam trajectories, space-charge effects, field errors, and a multipole corrector. The corrector consists of 12 rods arranged in a circle around the beam. Such a corrector has excellent properties as an electrostatic quadrupole, sextupole, or linear combination. The improved energy diagnostic will allow measurements of beam energy spread, such as caused by charge exchange or temperature anisotropy, and better understanding of experimental results in planned longitudinal beam studies. Examples for such experiments include investigations of a beam patching pulser to correct errors in the head and tail of the transported beam bunch, and energy errors derived from ripples in the injector voltage waveform.

Word Count: 177 Character Count: 980

Funding Agency Work performed under the auspices of the U.S. Department of Energy by the university of California, Lawrence Berkeley National Laboratory under Contract No. DE-AC03-76F00098.

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12/01/04 10:27 AM

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