

Resolution Study of a Retarding Energy Analyzer

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Abstract: A novel cylindrical retarding electrostatic field energy analyzer for low-energy beams has been designed, simulated, and tested with electron beams of several keV, in which space charge effects play an important role. A cylindrical focusing electrode is used to overcome the beam expansion inside the device due to space-charge forces, beam emittance, etc. In this paper, we present the resolution study of this energy analyzer with single particle simulation and beam envelope equation including space charge. The study shows that this energy analyzer can achieve very high resolution (with relative error of around 10^{-5}). The theoretical analysis is compared with experimental results.

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