Electric field solutions of a 90° electric sector charge analyzer for low energy Au\textsuperscript{-} ions

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A 90° electric sector has been developed to filter only Au\textsuperscript{-} ions of specific charges with energies not exceeding 200[eV]. A two-dimensional exact solution to the electric potential and electric field within the electric sector is formulated using Coulomb's law. A three-dimensional solution is also formulated but only for electric potential. Theoretical results are then compared and verified to simulated electric potential and electric fields using CST Particle Studio\textsuperscript{©} that utilizes finite difference time element computational methods. Experimental results using the electric sector on a plasma sputter-type negative ion source [1] (PSTNIS) that produce Au\textsuperscript{-} are also used to verify the theoretical and simulated results.


Figure 1. (a) Diagram of the 90° electric sector and (b) simulation of Au\textsuperscript{1-} beam trajectory inside the electric sector with an energy of 200[eV]