

# Integrated Ion Optics Design

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## Abstract

**Introduction:** The need for transferring charged particles through different pressure regions arises in several practical applications. An RF device capable of operating in the presence of neutral background gas was designed and optimized with COMSOL Multiphysics® software. Design goals were high transfer efficiency, flexibility, and reasonable producibility as well.

**Use of COMSOL Multiphysics®:** The charged particle tracing module was used to calculate particle trajectories along with the AC/DC Module to determine the electric field acting on the particles. Due to the pressure difference prescribed by the application a flow is expected, the flow field was calculated over the geometry using the CFD Module. The automatic postprocessing and parameter optimization was done with MATLAB®, thus the LiveLink™ for MATLAB® was involved as well.

**Results:** A device was designed to enhance the overall control of charged particles in some applications. Model results indicate this device will comply the expectations, thus a prototype is to be implemented for comparison of the model and experimental data.