

# RF-Only Quadrupole Mass Spectrometry for High Sensitivity at High Mass Resolution

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Quadrupole mass filters have become the mass analyzer of choice for a wide variety of applications. When one thinks of resolving masses using a quadrupole mass filter, one typically expects to have a combination of RF voltages, and resolving DC voltages applied to the rods, wherein the ratio of those two voltages controls mass resolution. There exists another way to get high sensitivity with high mass resolution out of a quadrupole mass filter by operating it in RF-only mode, with no resolving DC voltages, by simply applying a retarding potential at the exit lens of a quadrupole mass filter. In fact, for a given mass resolution, this mode of operation has been demonstrated to have higher absolute transmission than normal quadrupole operation with resolving DC voltages. Since this mode of operation only uses the  $\text{Beta}=1$ ,  $q=0.906$  boundary of the stability diagram, even a marginal quadrupole, with nominal observable peak defects when used with resolving DC voltages, due to non-ideal alignment of the quadrupole rods, can have nice peak shapes with good resolution at the baseline with this RF-only mode of resolving masses. This novel use of these normally problematic fringing fields at the end of a quadrupole mass filter will be explored in this presentation, along with an experimental validation of the proposed mechanism.