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A Computational Comparison of Ion Heating Rates in Conventional and Rotating rf-Electric Quadrupole Ion Traps[1] MICHAEL CUMMINGS, PHILLIP ASHBY[2], ROBERT THOMPSON — Two distinct field geometries are of interest for the containment of ions in linear rf-electric quadrupole ion traps: the conventional (or flapping) and the rotating forms of the trapping fields [1]. Although much theoretical and experimental work has been devoted to the multi-ion dynamics in conventional ion traps, only the single particle motion in the rotating geometry has been explored in any detail. Here, we present a computational study of the many particle dynamics for both trap geometries, focusing on the temperature dependent heating rates. A wide range of particle numbers and stability parameters (q values) are sampled, allowing for a detailed comparison of the thermal character of both traps. Additionally, the computational data are compared with the instability heating theory [2] and theoretical rf-heating rate calculations.

[1] T. Hasegawa and J. J. Bollinger, Phys. Rev. A **72**, 043403 (2005).

[2] T. J. Harmon, N. Moazzan-Ahmadi, and R. I. Thompson, Phys. Rev. A **67**, 013415 (2003).

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