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Ion Traps for Low-Energy Nuclear Science and Applications using Rare Isotopes

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Ion traps have become an essential tool for precision studies of rare isotopes, allowing researchers to confine and manipulate individual ions, or ensembles of ions, for extended periods. They are used in a wide variety of applications involving rare isotopes, from enabling measurements with unprecedented accuracy, even for species delivered at extremely low rates, to preparing high-quality, ultra-pure beams. They are routinely used in research related to nuclear structure, nuclear astrophysics, fundamental symmetries, and many other topics. This lecture will explore the fundamental principles of electromagnetic ion confinement, focusing on Penning traps, radiofrequency quadrupole traps, and electrostatic traps used at rare isotope facilities worldwide.

Email address

ringle@frib.msu.edu

Supervisor's Name

Supervisor's email

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Primary author: RINGLE, Ryan (FRIB/Michigan State University)

Presenter: RINGLE, Ryan (FRIB/Michigan State University)

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