

Abstract Submitted
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Precision mass measurement using two ions in a Penning trap¹

MATTHEW REDSHAW, JOSEPH MCDANIEL, THOMAS DEVORE, ELIZABETH WINGFIELD, WEI SHI², EDMUND MYERS, Florida State University, Department of Physics — We have implemented a technique for precision mass comparison of two ions simultaneously trapped in a Penning trap in which each ion is alternately positioned at the center of the trap – where its cyclotron frequency is measured – or else parked in a large cyclotron orbit. Using the method to compare $^{28}\text{SiH}_3^+ / ^{31}\text{P}^+$ we have obtained a new atomic mass for ^{31}P of 30.973 761 999 7(61) u. We have also used the method to observe shifts in the cyclotron frequency of the molecular ions CO^+ and PH^+ due to the interaction between the ion's polarizability and the motional electric field. Progress towards a) implementing *simultaneous* cyclotron frequency comparisons using two ions in a coupled magnetron orbit, b) a precision measurement of the mass difference between ^3T and ^3He , c) the use of polarizability shifts for single ion molecular spectroscopy, and d) a precision mass measurement of ^{40}Ca will also be reported.

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²Now at Department of Physics and Astronomy, University of Delaware

Edmund Myers
Florida State University

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