

Abstract Submitted  
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**Precision Mass Spectrometry and Polarizability Shifts with Two Ions in a Penning Trap**<sup>1</sup> MATTHEW REDSHAW, JOSEPH MCDANIEL, ELIZABETH WINGFIELD, BRIANNA MOUNT, EDMUND MYERS, Florida State University — We have implemented a technique for precision mass spectrometry with two ions simultaneously confined in a Penning trap in which each ion is alternately positioned at the center of the trap - where the cyclotron frequency is measured - or else parked in a large cyclotron orbit [1]. We have resolved previous systematics and have been able to exploit the improved statistical precision available with this technique. We have now used this technique to measure the mass ratios  $^{31}\text{P}^+ / ^{28}\text{SiH}_3^+$ ,  $^{28}\text{Si}^+ / ^{13}\text{C}_2\text{H}_2^+$  and  $^{28}\text{Si}^+ / ^{12}\text{C}_2\text{H}_4^+$  to obtain new values for the atomic mass of  $^{28}\text{Si}$  and  $^{31}\text{P}$ . In addition we have studied the ratio  $^{31}\text{PH}^+ / ^{16}\text{O}_2^+$  to measure shifts in the cyclotron frequency of  $^{31}\text{PH}^+$  due to the interaction between the ion's polarizability and the motional electric field. This has led to a measurement of the polarizability and dipole moment of  $^{31}\text{PH}^+$ . [1] M. Redshaw, J. McDaniel, W. Shi and E. G. Myers, *Int. J. Mass Spec.* **251**, 125 (2006).

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