

APR09-2009-000609

Abstract for an Invited Paper  
for the APR09 Meeting of  
the American Physical Society

### **Non-exponential orbital electron capture decay of Hydrogen-like Ions**

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In this talk we report on the observation of time-modulated orbital electron-capture decays of hydrogen-like  $^{140}\text{Pr}^{58+}$  and  $^{142}\text{Pm}^{60+}$  ions coasting in the ion storage-cooler ring ESR at GSI. By using non-destructive, time-resolved Schottky mass spectrometry of single ions it turned out that the expected exponential decay is periodically modulated in time with an oscillation period of about 7 seconds for both systems. By our special detection technique most of systematic errors, such as time-modulated detection efficiencies, can be excluded - at the expense of restricted counting statistics, however. The interpretation of the observed effect is broadly disputed in literature. Some scenarios show that our observations can be attributed to the coherent creation of finite mass eigenstates of the electron neutrino in these two-body weak decays. Electron capture decay of hydrogen-like  $^{122}\text{I}^{52+}$  has been studied very recently to investigate a possible scaling of the modulation frequency with the mass of the recoiling daughter nucleus. The data analysis is still in progress. The experiment, the preliminary results, and future plans will be discussed.