

Abstract Submitted  
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**Enhanced Sensitivity to Fundamental Constants In Ultracold Atoms and Molecules near Feshbach Resonances**<sup>1</sup> CHENG CHIN, James Franck institute and Physics Department, University of Chicago, VICTOR FLAMBAUM, University of New South Wales — Scattering length, which can be measured in Bose-Einstein condensate and Feshbach molecule experiments, is extremely sensitive to the variation of fundamental constants, in particular, the electron-to-proton mass ratio ( $m_e/m_p$  or  $m_e/\Lambda_{QCD}$ , where  $\Lambda_{QCD}$  is the QCD scale). Based on single- and two-channel scattering models, we show how the variation of the mass ratio propagates to the scattering length. Our results suggest that variation of  $m_e/m_p$  on the level of  $10^{-11} \sim 10^{-14}$  can be detected near a narrow Feshbach resonance by monitoring the scattering length on the 1% level. In this talk, we will present evidences that demonstrate the ultrahigh high sensitivity on atomic mass and suggest possible experiment approaches to precisely determine the scattering lengths.

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