Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Fate of the three-boson Efimov spectrum in the presence of one-dimensional spin-orbit coupling[1] QINGZE GUAN, DOERTE BLUME, Univ of Oklahoma — Spin-orbit coupled cold atom systems have attracted a great deal of attention recently since they provide an alternative route for realizing topological insulators and spintronics physics. The present work focuses on quantitatively and qualitatively novel few-body features of the experimentally most commonly realized 1D spin-orbit coupling in cold atom systems. In the absence of spin-orbit coupling, the three-boson system exhibits the Efimov effect: the entire energy spectrum is uniquely determined by the two-body s-wave scattering length and a single three-body parameter, and the critical scattering lengths at which the Efimov trimers merge respectively with the three-atom and atom-dimer thresholds serve as sensitive measures of the underlying discrete scale invariance. It is shown that the presence of the 1D spin-orbit coupling leads to significant changes of the Efimov spectrum. The critical scattering lengths are, due to the unique coupling between the relative and center-of-mass degrees of freedom, turned into scattering length windows. These scattering length windows should be observable experimentally, providing a clear few-body signature of the unusual characteristics of spin-orbit coupled systems such as the breaking of Galilean invariance.

[1]We gratefully acknowledge support by the NSF.

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Date submitted: 25 Jan 2018 Electronic form version 1.4