

Abstract Submitted  
for the DAMOP18 Meeting of  
The American Physical Society

**Details and Observables of Three-Dimensional Scattering between Two Rydberg Polaritons** HYUNWOO LEE, CHRIS GREENE, Purdue Univ — The properties and applications of Rydberg polaritons, whereby novel quantum optical phenomena can arise from combining the interactions between Rydberg atoms with control associated with electromagnetically-induced transparency (EIT), have received copious attention recently. Previous works on scattering between two polaritons assumed a 1-D geometry<sup>1</sup>, and then a 3-D treatment was undertaken with the explicit goal of predicting the Efimov effect between three equal-mass polaritons<sup>2</sup>. We present a formalism for understanding the details of basic two-polariton scattering in three dimensions (including such observables as the cross section and scattering lengths), with the goal of supplementing the current theories of the bound states of Rydberg polaritons.

<sup>1</sup>P. Bienias, et al., Scattering resonances and bound states for strongly interacting Rydberg polaritons, *Phys. Rev. A* **90**, 053804 (2014)

<sup>2</sup>M. J. Gullans, et al., Efimov States of Strongly Interacting Photons, *Phys. Rev. Lett.* **119**, 233601 (2017)

Hyunwoo Lee  
Purdue Univ

Date submitted: 26 Jan 2018

Electronic form version 1.4