Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

**Cold molecule assembly and nondestructive detection near a photonic nanostructure**[1] MING ZHU, MAY KIM, Purdue University, JESS PREZROS, Fritz-Haber-Institut der Max-Planck-Gesellschaft, CHEN-LUNG HUNG, Purdue University — Photoassociation (PA) is among the most powerful techniques to assemble molecules directly from cold and ultracold atoms into their deeply bound molecular states. However, PA-synthesized molecules can populate a sea of final (meta) stable rovibronic levels following radiative decay from the initial excited molecular state. To detect the final state population, conventional detection techniques such as resonance enhanced multiphoton ionization method have been widely adopted, which inevitably destroys PA-assembled molecules. In our experiment, we perform PA of cold atoms in the nearfield of a nanophotonic resonator. We aim at inducing strong coupling of the excited state molecule to the resonator mode to selectively enhance the radiative decay probability into the molecular rovibronic ground state. Meanwhile, the nanophotonic resonator also serves as an efficient molecule-photon interface, guiding the emitted photon for nondestructive molecular state detection following PA-synthesis. Here, we discuss our apparatus for cold molecule assembly on a nanophotonic resonator, and present our progress towards nondestructive detection of PA-synthesized molecules and enhancement of ground state molecule assembly.

[1]Funding is provided by the Office of Naval Research (N00014-17-1-2289).

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Date submitted: 01 Feb 2019 Electronic form version 1.4