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**Homonuclear cesium Rydberg molecules**<sup>1</sup> SETH RITTENHOUSE, HOSSEIN SADEGHPOUR, ITAMP, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA 02138 — Over a decade ago, a new type of molecule was predicted consisting of a highly excited Rydberg atom and a ground state atom within the Rydberg electron orbit. More recently these molecules were observed spectroscopically in s-wave dominated states- redshifted from atomic lines- in an ultra-cold gas of rubidium atoms. Later, it was shown that an energetically nearby set of nearly degenerate states admixes slightly into the electronic ground state resulting in a sizable permanent electric dipole moment. In cesium atoms, the analysis and prediction of vibrationally bound states is complicated by a near degeneracy between the  $ns$  Rydberg state and the degenerate higher angular momentum states. The resulting Born-Oppenheimer (BO) potentials show that a set of bound states above the  $ns$  threshold might form. In this talk, we present the predicted BO potentials for cesium Rydberg molecules and examine the metastable vibrational states.

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