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Photoassociation of cold $(RbCs)_2$ tetramers in the ground electronic state[1] MARKO GACESA, NASA ARC, ROBIN CÔTÉ, University of Connecticut — We theoretically investigate prospects for photoassociative formation of cold $(RbCs)_2$ tetramers from a pair of ultracold RbCs molecules. The long-range region of the potential energy surface (PES) of the lowest electronic state of $(RbCs)_2$ can be affected by orienting both RbCs molecules by an external electric field. In fact, we find a long-range barrier that supports long-range shelf states for relative angles between the dimers' internuclear axes smaller than about 20°. We show that these shelf states can be populated by spontaneous decay from the first excited electronic state which can be efficiently populated by photoassociation from the scattering continuum at ultracold temperatures. The vibrationally excited ground-state tetramer molecules formed this way have sufficiently long lifetimes to allow experimental detection. Moreover, for the relative angles between the dimers close to 20°, the proposed approach may result in production of deeply bound tetramers.

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Marko Gacesa
NASA ARC

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