Abstract Submitted
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Ultra-long-range molecule engineering via Rydberg-dressing[1] JIA WANG, Swinburne University of Technology, ROBIN COTE, University of Connecticut — We predict a new type of binding mechanism between ground state atoms based on aspects of three recent applications of Rydberg physics: Rydberg blockade, Rydberg dressing, and ultra-long-range Rydberg molecules. We show that it is possible to bind ground state atoms within the blockade volume using lasers to dress their interactions with a Rydberg trilobite-like state. As a result, pairs of atoms can be bound in potential wells at separations of thousands of Bohr radii. By choosing the Rydberg state judiciously, one can also affect the spatial orientation of the long-range Rydberg dressed ground state molecules. We explore how the dressed potentials can be tuned by selecting the parameters of the dressing lasers, which allows engineering of the molecular bond and its geometry.

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