

Abstract Submitted
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Cold chemistry in high density atom-ion environments¹ JESUS PEREZ-RIOS, Department of Physics and Astronomy, Purdue University, ARTJOM KRUKOW, AMIR MOHAMADI, JOSCHKA WOLF, TOBIAS SCHENETZER, JOHANNES HECKER DENSCHLAG, Institut für Quantenmaterie and Center for Integrated Quantum Science and Technology IQST, Universität Ulm, CHRIS H. GREENE, Department of Physics and Astronomy, Purdue University — A single laser cooled $^{138}\text{Ba}^+$ is brought in contact with a high density atomic cloud of ultracold ^{87}Rb atoms, as a result, different chemical reactions leads to the formation of atomic and molecular products that are detected. We show by first principles, as well as it is confirmed in the experiment, that three-body recombination is the main physical process behind the cold chemical reactions in high density atom-ion environments. In particular, it is found that the observed final products are a consequence of the three-body process followed by subsequent chemical processes, which are also studied. This work elucidates the role of the density in the chemical reactivity in ion-neutral systems.

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