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Rydberg Atom Population Distributions in Ultracold Plasmas¹ ROBERT FLETCHER, XIANLI ZHANG, STEVEN ROLSTON — Despite being an important collisional process in cold plasmas, three-body recombination (3BR) is described by a rate expression that has yet to be strongly confirmed for very low electron temperatures. While the low temperature 3BR rates have recently been measured in an ultracold plasma, the strong temperature dependence $(T^{-9/2})$ of the 3BR rate expression, combined with the difficulty of accurately measuring electron temperatures of ultracold plasmas, makes it difficult to verify the 3BR rate expressions at low temperatures. In this work, we use microwave ionization to measure the Rydberg population distributions in an ultracold plasma in an attempt to test the predictions of 3BR rate theory. This method of testing 3BR rate equations has a clear advantage over measuring the overall 3BR rate, as it is far less dependent on the particular electron temperature of the plasma.

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Robert Fletcher

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