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Modeling the Effects of State-Mixing Interactions near Forster Resonance[1] TOMOHISA YODA, MILO EDER, ANDREW LESAK, ABIGAIL PLONE, JASON MONTGOMERY, AARON REINHARD, Kenyon College — State-mixing interactions can compromise the effectiveness of the Rydberg excitation blockade when ultracold atoms are excited to high-lying states near Forster resonance. Up to $\sim$50% of atoms can be found in dipole coupled product states within tens of ns after excitation. We use state-selective field ionization spectroscopy to measure, on a shot-by-shot basis, the distribution of Rydberg states populated during narrowband laser excitation of ultracold rubidium atoms. Our method allows us to quantify both the number of additional Rydberg excitations added by each mixing event, as well as the extent to which state-mixing "breaks" the blockade. We use a Monte Carlo method to model the effect of experimental noise sources on our data. We find good agreement when we assume that state-mixing is a three-body process, except near exact Forster resonance.

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Aaron Reinhard
Kenyon College

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