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**Freezing of spinor dynamics in an ultracold Bose gas via microwave dressing** ZHIFAN ZHOU, MADISON ANDERSON, DON FAHEY, Joint Quantum Institute, NIST and the University of Maryland, JONATHAN WRUBEL, Creighton University, PAUL LETT, Joint Quantum Institute, NIST and the University of Maryland — The antiferromagnetic F=1 sodium spinor Bose-Einstein condensate (BEC) exhibits coherent population oscillations among the magnetic sublevels that are driven by spin-exchange collisions. This spinor dynamics depends on the relative energy of the magnetic sublevels, such as the quadratic Zeeman shift via a homogenous magnetic field. Microwave dressing in spinor BEC experiments provides additional control by allowing for negative shifts of the atomic energy levels and fast switching times for quench experiments. Here we demonstrate that by switching the microwave dressing to a large value the dynamics of the coherent population oscillations freezes. This can happen at a variable stage of the spinor evolution including after the release from a trapping potential. We have developed a theoretical model to analyze these phenomena. The technique will enable an enriched control of spinor dynamics and a new tool to interrogate the ultracold gas.

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