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Quantum statistical effects in the dissociation of a Bose-Einstein condensate of molecules MICHAEL JACK, HAN PU, Rice University — We consider the dissociation of a molecular Bose-Einstein condensate transfered to the unstable side of a Feshbach resonance by rapidly tunning the magnetic field back through the resonance. The dissociation of the molecular condensate into correlated pairs of atoms exhibits very rich quantum dynamics which depends on the quantum statistics of the constituent atoms when the mode occupation gets large. A unified treatment of this dissociation is presented which includes both dissociation into pairs of bosonic and fermionic atoms. We show that in the case of bosonic atoms, Bose-enhancement can lead to stimulated dissociation, whereas, in the case of fermions, Pauli-blocking of the available states can give rise to incomplete dissociation of the molecules and a non-trivial oscillating final state. This work is applicable to narrow Feshbach resonances as it is easier, experimentally, to rapidly tune across the resonance and, secondly, they have a narrow dissociation linewidth which reduces the effective density of available states and therefore enhances the effects of quantum statistics.

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