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Internal state cooling using optical frequency combs in the presence of decoherence[1] SVETLANA MALINOVSKAYA, TOM COLLINS, Stevens Institute of Technology — We discuss a theory of internal state cooling of molecules from Feshbach states using optical frequency combs and taking into account decoherence. The technique makes use of multiple two-photon resonances induced by optical frequencies present in the comb. It provides us with a useful tool to study the details of molecular dynamics at ultracold temperatures. Particularly, we analyze the impact of spontaneous decay of intermediate, electronically excited states, and collisions that involve ultracold molecules and molecules in Feshbach state as well as in the excited states. We show that the interplay of the spontaneous decay rate and the collision rate may result in an increase of the quantum yield of ultracold molecules. The fact that an optical frequency comb may address several excited states having different decay rates and transition dipole moments justifies the viability of its implementation for molecular cooling.

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