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Dynamical projection of atoms to Feshbach molecules at strong coupling. ROMAN BARANKOV, UIUC, LEONID LEVITOV, MIT — An interesting method of atomic state projection to the Feshbach molecules using the magnetic field sweep through the resonance was employed in the recent experiments [1]. The sweep could be made very fast compared to typical fermion time scales, such as the collision frequency or inverse Fermi bandwidth, making the process a "snapshot probe" with regard to the collective fermion processes. On a single particle level, broad Feshbach resonances studied in Ref.[1], exhibit strong atom-molecule coupling in a relatively wide detuning range. In this sense, the sweep speed [1] corresponds to essentially adiabatic atom/molecule conversion, slow on the scale of the resonance width. We develop a theory [2] that describes molecules at a sweep fast compared to the elastic collisions, when only the quantum-mechanical processes involving two atoms transition into a molecule are relevant. Our approach accounts for resonance dissociation/association in the presence of time-dependent detuning as well as for fermion pairing correlations in the initial state. An exact solution is found, predicting a 1/3 power law dependence on the inverse sweep rate for molecule production efficiency at fast sweep. The predicted production efficiency agrees with experimental observations for both condensed and incoherent molecules away from saturation. [1] C. A. Regal, *et al.*, Phys. Rev. Lett. **92**, 040403 (2004); M. W. Zwierlein, *et al.*, Phys. Rev. Lett. **92**, 120403 (2004) [2] R. A. Barankov and L. S. Levitov, cond-mat/0506323

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