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Non-adiabatic dynamics of strongly paired fermions across a Feshbach resonance MAXIM DZERO, Kent State University, EMIL YUZBASHYAN, Rutgers University, VICTOR GURARIE, University of Colorado - Boulder — We present a theory of far-from-equilibrium degenerate Fermi gas interacting through a diatomic Feshbach resonance. The basis of our theory is a two-channel model which describes strongly interacting fermionic and bosonic (molecular) degrees of freedom. We employ integrability of the two-channel model to describe the limiting dynamics of the pairing amplitude as well as the steady state wave function for sudden changes of detuning frequency across the BCS-BEC crossover. In collisionless regime, on a time scale larger then the order parameter relaxation time condensate reaches a steady state. We find the following three steady states for an arbitrary strength of the perturbation: (i) gapless steady state; (ii) steady state with constant value of the order parameter; (iii) steady state with the periodic order parameter and determine the asymptotic behavior of the order parameter in each of these regimes exactly. We also discuss the features of the superfluid steady-state dynamics which would allow experimental verifications of our results.

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