T-matrix approach for few-body problems in ultracold atomic gases[1] XIAOLING CUI, Intitute for Advanced Study in Tsinghua University, COLD ATOM THEORY GROUP IN CASTU TEAM — We propose a systematic T-matrix approach to solve few-body problems in a dilute atomic gas. The problem is generally reduced to a matrix equation expanded by a set of orthogonal molecular states, describing external center-of-mass motions of pairs of interacting particles; while each matrix element is guaranteed to be finite by a proper renormalization for internal relative motions. This approach is able to incorporate various scattering issues in a single framework, including the bound state, effective scattering length and reduced interaction in lower dimension(s). Finally this method is applied to study three fermions in a (rotating) harmonic trap, where exotic scattering properties are uniquely identified and the results should shed light on quantum Hall physics in this system.

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