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The cluster effective field theory for nuclear reactions

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We discuss an application of the cluster effective field theory (EFT) to nuclear reactions at low energies. A target reaction of the present talk is the $E1$ transition of radiative α capture on ^{12}C, which is a fundamental reaction in nuclear-astrophysics. We review our recent works to construct the cluster EFT for the reaction, fix some of the coupling constants of the effective Lagrangian by using the elastic α-^{12}C scattering data, and calculate the $E1$ transition rate of the radiative alpha capture rate at the Gamow-peak energy, $T_G = 0.3$ MeV. We also review a calculation of β delayed α emission from ^{16}N and discuss possible applications of the present approach to other reactions.

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