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Spatial measure of reaction size in proton scattering MASASHI TOMITA, MASATAKA IWASAKI, REIJI OTANI, MAKOTO ITO, Department of pure and applied physics, Kansai university — The Hoyle state in ^{12}C has a developed 3α cluster structure, and its matter radius is expected to be enhanced by about 50 percent in comparison to the radius of the ground state. However, the enhanced radius of the 3α state is not confirmed experimentally. Recently we have proposed "the scattering radius," which characterizes a spatial size of an exclusive reaction in a general two-body scattering problem. In the present study, we perform the microscopic coupled-channel calculation for the proton $+^{12}$C system, and the scattering radii for the inelastic scatterings to various excited states are evaluated. The proton - ^{12}C nuclear interactions are derived from the folding model, which employs the density-dependent M3Y effective nucleon-nucleon interaction and the ^{12}C transition densities, obtained from the microscopic 3α cluster model. We have calculated the angular distributions for the inelastic scattering to the collective states (2^+_1 and 3^-_1) and the 3α cluster states (0^+_2 and 2^+_2). The scattering radii are derived for the individual channels, and we have confirmed the strong enhancement of the scattering radii in the 3α channels, which is consistent to the picture of the nuclear α condensation. In the present report, we will explain the enhancement of the scattering radii in the 3α channels in connection to the matter radii of the 3α cluster states.

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