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## A study of $^{14}\text{O}$ via $^{10}\text{C} + \alpha$ elastic scattering: evidence of alpha clustering

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We have studied the structure of the proton-rich  $^{14}\text{O}$  nucleus by performing the  $^{10}\text{C} + \alpha$  elastic scattering measurement at the CRIB facility (CNS, the university of Tokyo). Recently, the cluster nature for some resonances was identified in the mirror nucleus  $^{14}\text{C}$  via the  $^{10}\text{Be} + \alpha$  reaction (1). A preliminary Resonating Group Method (RGM) calculation has suggested that also the  $^{10}\text{C} + \alpha$  system may present resonances with a large reduced width, an indication of clustering effects. The radioactive beam of  $^{10}\text{C}$  was produced at CRIB using the  $^{10}\text{B}(p,n)^{10}\text{C}$  reaction, using a  $^{10}\text{B}$  primary beam with energy 69.9 MeV (AVS cyclotron, RIKEN). The primary target was  $\text{H}_2$  at 400 Torr and 77K. The secondary beam  $^{10}\text{C}$  was produced at 36 MeV with a beam purity better than 97%. The gas chamber was filled with helium gas at 650 Torr and sealed with the Mylar window. Three DeltaE-E silicon detector telescopes were used in the gas chamber at different angles.

By measuring the protons and the  $\alpha$  particles, a complex resonant structure for  $^{14}\text{O}$  was observed in the excitation energy region 13-18 MeV. By performing an R-matrix analysis of the elastic scattering data at several angles, some evidence of alpha clustering in  $0^+$  and  $2^+$  states has been observed, in fair agreement with the microscopic cluster model.

A better understanding of the nuclear structure of this nuclear mass region is relevant for future nuclear astrophysical studies.

(1) H. Yamaguchi et al., Physics Letters B 766, 11 (2017)

**Primary authors:** Prof. SFERRAZZA, Michele (Université Libre de Bruxelles); MA, N.R. (Center for Nuclear Study, the University of Tokyo, Wako branch, Wako, Japan and Department of Nuclear Physics, China Institute of Atomic Energy, Beijing, China); YAMAGUCHI, H. (Center for Nuclear Study, the University of Tokyo, Wako branch, Wako, Japan); DESCOUVEMONT, P. (Department of Physics, Université Libre de Bruxelles, Brussels, Belgium)

**Co-authors:** OKAMOTO, S. (Department of Physics, Kyoto University, Japan); CHERUBINI, S. (INFN-LNS and dipartimento di Fisica e Astronomia "E. Majorana", University of Catania, Italy); DOI, T. (Department of Physics, Kyoto University, Japan); FUJIKAWA, Y. (Department of Physics, Kyoto University, Japan); HAYAKAWA, H. (Center for Nuclear Study, the University of Tokyo, Wako branch, Wako, Japan); INABA, K. (Department of Physics, Kyoto University, Japan); KAWABATA, T. (Department of Physics, Osaka University, Japan); KOHDA, A. (Department of Physics, Osaka University, Japan); LA COGNATA, M. (INFN, Laboratori Nazionali del Sud, Catania, Italy); MANICO, G. (INFN, Laboratori Nazionali del Sud, Catania, Italy); PALMERINI, S. (INFN and University of Perugia, Perugia, Italy); PIZZONE, R.G. (INFN, Laboratori Nazionali del Sud, Catania, Italy); SAKAUE, A. (Department of Physics, Kyoto University, Japan); SAKANASHI, K. (Department of Physics, Osaka University, Japan); SHIZUMU, H. (Center for Nuclear Study, the University of Tokyo, Wako branch, Wako, Japan)

**Presenter:** Prof. SFERRAZZA, Michele (Université Libre de Bruxelles)

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