STUDY OF ^{9}LI-α CLUSTER STATES IN ^{13}B USING THE RESONANT SCATTERING METHOD

Alessia Di Pietro, INFN- Laboratori Nazionali del Sud, Catania, Italy

J.P. Fernandez-Garcia[1,2], F. Ferrera[1], P. Figuera[1], M. Fisichella[1], M. Lattuada[1,2], D. Torresi[1,2], M. Alcorta[3], M.J.G. Borge[4], T. Davinson[5], A. Laird[6], A.C. Shotter[5], N. Soic[7], O. Tengblad[4], C. Ruiz[3], M. Zadro[8]

1 INFN-Laboratori Nazionali del Sud, Catania, Italy
2 Dipartimento di Fisica, Università di Catania, Catania, Italy

3 TRIUMF, Vancouver, Canada

4 Instituto de Estructura de la Materia CSIC, Madrid, Spain

5 School of Physics and Astronomy, University of Edinburgh, Edinburgh, Uk

6 Department of Physics, University of York, York, UK

7 Division of Experimental Physics, Ruder Boskovic Institute, Zagreb, Croatia

Clustering phenomena are well known in nuclear physics. Indeed, some properties of nuclei can be simply described by assuming a nuclear structure made of a few weakly interacting clusters. In n-rich nuclei, the α-α cluster structure as a core may persist, it is the exchange of neutrons between the α–particle cores which binds the system. It is also predicted that light exotic nuclei may show cluster configurations where at least one of the clusters is unbound or weakly bound, thus not satisfying the strong internal correlation requirement of classical clusters. Indeed, in n-rich nuclei the clusters may not only be ordinary stable particles, as for example the α-particle, but are somewhat deformed and easy to polarize. This is the so-called exotic clustering, that was claimed to become more and more favored when nuclei approach the drip-line. Antisymmetrized Molecular Dynamics (AMD) [1] calculations indicate the possible existence of exotic clustering in neutron-rich isotopes of various elements as for example Beryllium or Boron. As far as Boron is concerned, calculations performed in the framework of AMD are able to describe states of its very neutron-rich isotopes in terms of two components with atomic number 2 and 3 respectively.

We undertook the first experimental study of exotic ^{9}Li+α cluster states of ^{13}B using the Thick Target Inverse Kinematics (TTIK) method using the ^{9}Li beam available at TRIUMF. The ^{9}Li beam was stopped in a Helium-flooded chamber. The elastically scattered (recoil) alpha particles were detected by Si DE-E telescopes placed around 0^0 in the laboratory system corresponding to 180^0 in the center of mass. Detectors were placed also off 0^0 in order to have information on the angulardependence of the cross-section. The excitation function of ^{13}B shows the presence of various peaks in an excitation energy region never explored before. In this contribution the results of the experiment will be discussed.

REFERENCES

[1] Y. Kanada-En'yo and H. Horiuchi Prog. Theor. Phys., 2001, Vol. 142 p. 205.