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Study of 10He by the 11Li(d, 3He) transfer reaction

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Resonant states of unbound 10He have been studied by the missing mass method using the 11Li(d,3He) reaction to investigate 10He structure. This nucleus was first studied at RIKEN in a pioneering work [1] using the invariant mass method in 8He+n+n channel. A recent experiment at GSI [2] leads to compatible results for the first resonant state at 1.2 MeV . An experiment using 8He(t,p) reaction [3] shows no evidence of a state below 3 MeV above the two neutrons threshold. Spectroscopy of resonant states of 10He remains ambiguous.

The missing mass method allows to reconstruct the excitation energy spectrum independently of the decay channel. The experiment was performed at the RIKEN RIPS facility, using a secondary beam of 11Li at 50 AMeV impinging on a CD2 target. At forward angle, a wall of four MUST2 telescopes [4] was coupled with four 20 μm thick silicon detectors for light particles identification. Heavy beam-like residues were detected around zero degree using a fifth MUST2 telescope. In addition a 9Li beam at 50 AMeV was used to perform a reference experiment. 8He and 10He excitation energy spectra will be discussed and associated differential cross sections will be compared to DWBA calculations using various wave function overlaps.

[1] A.A. Korsheninnikov et al, Phys. Lett. B 326, 31 (1994).
[2] H.T. Johansson et al, Nucl. Phys. A Volume 842, 15 (2010).
[3] M.S. Golovkov et al, Phys. Lett. B Volume 672, 22 (2009).
[4] E. Pollacco et al, Eur. Phys. J. A25, 287 (2005).

Primary authors: MATTA, Adrien (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr BEAUMEL, Didier (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr OTSU, Hideaki (Riken Nishina Center)

Co-authors: Dr OBERTELLI, Alexandre (CEA-Saclay IRFU/SPhN); Dr SANCHEZ-BENITEZ, Angel Miguel (Universidad de Huelva); Dr SUZUKI, Daisuke (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr POLLACCO, Emmanuel (CEA-Saclay IRFU/SPhN); Dr KUZMIN, Evgenii (NRC "Kurchatov Institute"); Dr NIKOLSKII, Evguenii (Riken Nishina Center - NRC Kurchatov Institute); Dr HAMMACHE, Fairouz (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr DELAUNAY, Franck (LPC Caen, ENSICAEN, Université de Caen, CNRS/IN2P3); Dr WANG, He (Riken Nishina Center); Dr BABA, Hidetada (Riken Nishina Center); Dr SAKURAI, Hiroyoshi (Riken Nishina Center); Dr STEFAN, Iulian (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr SCARPACI, Jean-Antoine (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr GIBELIN, Julien (LPC Caen, ENSICAEN, Université de Caen, CNRS/IN2P3); Dr YONEDA, Kenichiro (Riken Nishina Center); Dr NALPAS, Laurent (CEA-Saclay IRFU/SPhN); Dr JENNY, Lee (Riken Nishina Center); Dr ASSIE, Marlene (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr TAKECHI, Maya (Riken Nishina Center); Dr NISHIMURA, Mizuki (Riken Nishina Center); Dr DE SEREVILLE, Nicolas (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Dr IMAI, Nobuaki (KEK); Mr KOBAYASHI, Nobuyuki (Department of Physics, Tokyo Institut of Technology); Dr AOI, Nori (Riken Nishina Center); Dr WOLSKI, Roman (INP Krakow); Mr CHEN, Rui-jiu (Riken Nishina Center); Dr TAKEUCHI, Satoshi (Riken Nishina Center); Dr FRANCHOO, Serge (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI); Mr BOISSINOT, Simon (CEA-Saclay IRFU/SPhN); Mr KOUTAROU, Takahashi (Department of Physics, Tokyo Institut of Technology); Prof. NAKAMURA, Takashi (Department of Physics, Tokyo Institut of Technology); Mr SAKO, Takayuki (Department of Physics, Tokyo Institut of Technology); Dr MOTOBAYASHI, Tohru (Riken Nishina Center); Dr KUBO, Toshiyuki (Riken Nishina Center); Dr LAPOUX, Valerie (CEA-Saclay IRFU/SPhN); Dr TOGANO, Yasuhiro

(Riken Nishina Center); Mr KAWADA, Yosuke (Department of Physics, Tokyo Institut of Technology); Dr KONDO, Yosuke (Department of Physics, Tokyo Institut of Technology)

Presenter: MATTA, Adrien (IPN Orsay - CNRS/ IN2P3 / Universite Paris-Sud XI)

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