STRUCTURE OF THE WEAKLY-BOUND ^{8}He VIA DIRECT REACTIONS ON PROTON TARGET

F.Skaza[1], V.Lapoux[1],*, N. Alamanos [1], E.C. Pollacco [1,] F. AA.Drouart [1], A. Gillibert[1], N.Keeley [1], L. Nalpas [1], R. Raabe [1,a], J.-L. Sida[1], D Beaumel[2],E.Becheva[2], Y.Blumenfeld [2], F.Delaunay [2], L.Giot [3], K.W.Kemper [4], R.S.Mackintosh [5], A.Pakou[6], P.Roussel-Chomaz [3], J.-A Scarpaci [2], S.Stepantsov [7], R.Wolski [7,8]

[1] CEA-SACLAY DSM/DAPNIA/SPhN F-91191 Gif-sur-Yvette, France;
[2] IPN, IN2P3-CNRS, F-91406 Orsay, France;
[3] GANIL , Bld Henri Becquerel, BP 5027, F-14021 Caen Cedex, France;
[4] Department of Physics, FSU, Tallahassee, Florida 32306-4350, USA ;
[5] Department of Physics and Astronomy, The Open Univ., Milton Keynes,, UK;
[6] Department of Physics, University of Ioannina, 45110 Ioannina, Greece;
[7] Russian Flerov Laboratory of Nuclear Reactions, JINR, Dubna, RU-141980 Russia
[8] H. Niewodniczaÿski Institute of Nuclear Physics, Cracow, Poland;
[a] permanent address : IKS, University of Leuven, B-3001 Leuven, Belgium.

Angular distributions of the elastic and inelastic scattering to the first 2^{+} state of ^{8}He on a proton target were measured at 15.7A.MeV, using the Spiral facility at GANIL. Other direct reactions ^{8}He(p,d)^{7}He g.s. [1] and (p,t) were measured simultaneously. The light charged particles (p,d,t) were unambiguously identified and measured in the MUST telescope array. The excitation spectra for the ^{8}He and the unbound ^{7}He [1] were extracted. The (p,d) cross sections are large compared to the elastic ones [1,2]. To include the strong coupling effects of the ^{8}He(p,d)^{7}He g.s. on the ^{8}He(p,p'), the data were analyzed within the framework of the coupled-reaction-channel (CRC) method [3 and ref. therein]. The ^{8}He(p,p') and transfer ^{8}He(p,d) reactions were included in the channel coupling scheme of the continuum discretized coupled channel calculations. The entrance channel potential and transition form factor from ground state (gs) to 2^{+} state were calculated within the framework of the microscopic complex JLM [4] nucleon-nucleus potential using the microscopic 8He gs and transition densities, generated by the no-core shell model [5]. Including explicitly the coupling to the (p,d), the (p,p) reaction is well reproduced [2]. It is shown that this coupling changes deeply the features of the entrance potential and strongly affects the extraction of the structure information. These results recall that, in general, it is essential to measure the (p,d) reaction and include it explicitly in the analysis of the (p,p') scattering if correct information on structure is to be drawn.

1. F. Skaza et al., submitted to PRC.
2. F. Skaza et al., submitted to PLB.
3. N. Keeley, N. Alamanos, and V. Lapoux, Phys. Rev. C 69, 064604 (2004).
4. J.-P. Jeukenne, A. Lejeune, and C. Mahaux, Phys. Rev. C 16, 80 (1977)..
5. P. Navrátil and B.R. Barrett, Phys. Rev. C 57, 3119 (1998).; and P. Navrátil, private comunication.