In-beam γ spectroscopy using DIC with radioactive Ne beams

F. Azaiez[1], G. Benzoni[2], S.Leoni[2], A.Bracco[2], S.Bhattacharyya[3],R.Borcea[4], L.Corradi [5], D.Curien[6], G.De France[3], Zs.Dombrady[7], E.Fioretto[5], S.Franchoo[1], S.Grevy[3], F.Ibrahim[1], S.Iulian[8], , G.Mukherjee[3], A.Navin[3], G.Pollarolo[9], N.Redon[10], P.Regan[11], M.Rejmund[3], C.Schmitt[10], G.Sletten[12], D.Sohler[7], M.Stanoiu[1] and S.Szilner[5], D.Verney[1]

[1] *IPN Orsay, France*
[2] *Università degli studi and INFN Milano, Milano, Italy*
[3] *Ganil, Caen, France*
[4] *Horia Hulubei National Institute of Physics and Nuclear Engineering, Bucharest, Romania*
[5] *LNL, Legnaro, Italy*
[6] *IReS Strasbourg, France*
[7] *Atomki, Debrecen, Hungary*
[8] *LPC, Caen, France*
[9] *Università di Torino, Torino, Italy*
[10] *IPN Lyon, France*
[11] *University of Surrey, Guildford, UK*
[12] *NBI Copenhagen, Denmark*

Deep-inelastic and multitransfer reactions have been largely used to study heavy systems [1], and no information is yet available regarding the effectiveness of these reaction mechanisms going towards lighter nuclei. The preferred production mechanisms used to investigate the region of light nuclei, such as O, Ne and F, have been direct reactions [2] and, more recently, two-step fragmentation [3]. Multi-transfer reactions can be an important complementary tool to populate this mass region, in particular allowing to reach higher spins. In this respect a series of experiments have been proposed both at Laboratori Nazionali di Legnaro and Ganil, employing stable and radioactive beams.

The first experiment has been performed in June 2005 in Ganil with the VAMOS spectrometer coupled to the EXOGAM Ge-detectors array. The reaction studied employed a beam of ^{24}Ne at 190 MeV impinging on a thick (10.9 mg/cm^2) target of ^{208}Pb. This allows for the first time to perform in-beam γ spectroscopy using deep inelastic collisons with a radioactive ion beam.
Even if the beam intensity was quite low, $I_{beam} \approx 1.5 * 10^5$ pps, the population of oxygen isotopes, corresponding to the 2p-removal channel, with a cross section predicted to be on the order of the mb [4], has been observed.

The detailed analysis is in progress and will give results on the relative cross-sections for the different decay channels, together with spectroscopic information about the population of the states with this specific reaction mechanism. The results of this experiment will be compared with detailed calculations using the Grazing code [4].

References

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