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Analysis of two-proton transfer in the 40Ca(18O,Ne)38Ar and 116Cd(20Ne,18O)118Sn reactions

We analysed the angular distribution of two-proton pickup transfer for the 40Ca(18O,20Ne)38Ar reaction at 270 MeV incident energy. The coupled reaction channel (CRC) and coupled channel Born approximations (CCBA) methods were considered in the theoretical calculations to obtain the two-proton transfer angular distributions, in which the results have reproduced very well the experimental data. In addition, we also analysed the two-proton stripping transfer reaction corre- sponding to the 116Cd(20Ne,18 O)118Sn, at 306 MeV bombarding energy, for which the integrated cross section for the final channels 18O gs(0+) +118 Sn gs(0+) and 18O gs(0+) +118 Sn 1.23(2+) were measured. The data were quite well described by the theoretical results. The one- and two-proton spectroscopic amplitudes were derived from the shell model calculations. In this work, we have discussed the role of the paring correlations during the transfer process to populate the final channels in the present reactions. Besides, once these reactions might strongly compete with the double charge exchange reaction, like 40Ca(18O,18Ne)40Ar [1] and 116Cd(20Ne,20O)116 Sn [2], is extremely important to be confident with respect to the prediction of transfer cross section mainly for many reactions for which there is no experimental information that might compete with double charge exchange reaction. This measurement of the double charge exchange cross sections for different systems is the main objective of the NUMEN project.

[1] F. Cappuzzello et al., Eur. Phys. J. A 51, 145 (2015).

[2] F. Cappuzzello et al., Eur. Phys. J. A 54, 72 (2018)

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