Contribution ID: **477** Type: **Poster**

# Spectroscopic data on the 25Mg→24Mg+n excited configurations from the 24Mg(d,p)25Mg reaction.

*Thursday 3 July 2025 18:40 (20 minutes)*

The aim of this work was to obtain precise experimental differential cross sections (DS) of the neutron transfer reaction 24Mg(d,p)25Mg for subsequent extraction of asymptotic normalization coefficients (ANC) and spectroscopic factors (SF). These data are necessary both to clarify the structure of light nuclei and to calculate the astrophysical S-factors of processes in the MgAl cycle of stellar proton burning: 24Mg(p,γ)25A1(β+)25Mg(p,γ)26A1(β+)26Mg, using the relationship between the mirror states of 25Mg and 25Al nuclei.

The DS of the 24Mg(d,p)25Mg reaction have been measured in the forward hemisphere of the angles for the neutron stripping process to the states $E^*$=0.585 MeV, ½+; 0.975 MeV, 3/2+, 1.61 MeV, 7/2+; 1.96 MeV, 5/2+ and 2.56 MeV, 1/2+ of the 25Mg nucleus at Ed=14.5 MeV. The DS for the $E^*$=0.0 MeV, 5/2+ is given in work [1] as well as the description of experiment which was carried out at the deuteron beam of the U-150M accelerator of INP RKaz.

The experimental DS have been analyzed in the framework of the modified distorted wave Born approximation (MDWBA) [2] using the DWUCK5 [3] code. Our previous analysis [4] has shown that the neutron transfer to the ground state of the 25Mg nucleus is non-peripheral process. Here it is shown that this process becomes more peripheral with increasing the excitation energy of the final nucleus, which allowed us to estimate the values of the neutron coupling ANC for the above-mentioned excited states of the 25Mg nucleus and evaluate the dependence of extracted SF values on the geometry parameters of the Woods-Saxon neutron binding potential.

The obtained results will be further used to calculate the astrophysical S-factors of the radiative capture process 24Mg(n,γ)25Mg at astrophysical relevant energies.

References

1. S.V. Artemov, N. Burtebayev, S.B. Igamov, A.A. Karakhodjaev, O.R. Tojiboev, B.S. Yuldashev // Doklady Akademii Nauk Uzbekistan #3, (2018) 38.
2. S.V. Artemov et al., Eur. Phys. J. A 58:24 (2022).
3. P. D. Kunz, University of Colorado, «Computer code DWUCK5», http://spot.colorado.edu/ kunz/DWBA.html
4. O.R. Tojiboev et al., Acta Physica Polonica B Proceedings Supplement Vol. 14 (2021)

**Primary authors:** KARAKHODJAEV, Akhror (Institute of Nuclear Physics, 100214, Ulughbek, Tashkent, Uzbekistan); IKROMKHONOV, Erkinjon (Institute of Nuclear Physics, 100214 Tashkent, Uzbekistan); ERGASHEV, Feruzjon (Institute of Nuclear Physics, 100214, Ulughbek, Tashkent, Uzbekistan); SON, Irina (Institute of Nuclear Physics, 100214, Ulughbek, Tashkent, Uzbekistan); NASSURLLA, Maulen (Institute of Nuclear Physics, 050032 Almaty, Kazakhstan; Al-Farabi Kazakh National University, 050040 Almaty, Kazakhstan); BURTEBAYEV, Nasurlla (Institute of Nuclear Physics, 050032 Almaty, Kazakhstan); TOJIBOEV, Olimjon (Institute of Nuclear Physics, 100214, Ulughbek, Tashkent, Uzbekistan); ARTEMOV, Sergey (Institute of Nuclear Physics, 100214, Ulughbek, Tashkent, Uzbekistan)

**Presenter:** IKROMKHONOV, Erkinjon (Institute of Nuclear Physics, 100214 Tashkent, Uzbekistan)

**Session Classification:** 9. Poster Session

**Track Classification:** Section 2. Experimental and theoretical studies of nuclear reactions.