Applying TalysLib Library for Optimization of Optical Potential Parameters for Neutron Scattering on ^{24}Mg and ^{32}S

G.V. Pampushik[1], N.A. Fedorov[2]

[1]Lomonosov Moscow State University, Moscow, Russia
[2]Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Dubna, Russia
[1]E-mail: pampushik.g@gmail.com

In the Frank Laboratory of Neutron Physics, the international project TANGRA is being implemented to study the scattering of tagged 14.1 MeV neutrons on atomic nuclei. For the purposes of the theoretical part of the project, the TALYS program is used. It has wide functionality, and also contains nuclear structure database and set of the nuclear reaction models parameters, based on the RIPL-3 library [2]. The main way to describe neutron-nuclear reactions in this program is the optical model, which is used to calculate the elastic and inelastic scattering cross sections. To simplify access to the calculation results and the TALYS database, as well as EXFOR [3] databases, object oriented C++ library, TalysLib is being developed. Using its functional we obtained new sets of optical model parameters for fast neutron scattering on ^{24}Mg and ^{32}S which will be presented. An example of optimizing parameters on ^{32}S is given on Fig. 1. It can be clearly seen what our calculations is better approximate experimental data than default TALYS calculations.
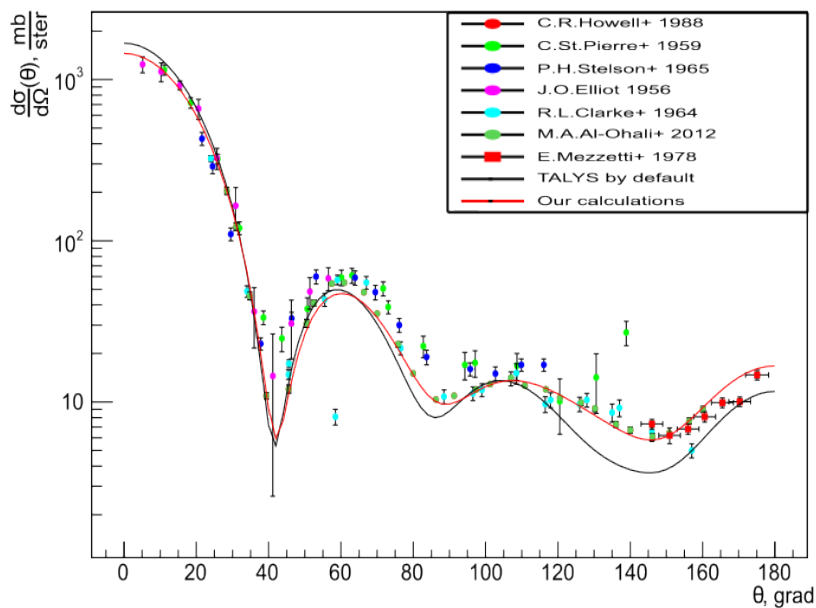

Fig. 1. Results of optical parameters optimization for elastic neutron scattering on ^{32}S. Black line – TALYS by default, red line – our calculations. All experimental data were received from EXFOR by using TalysLib.

1. Koning A. J., Hilaire S., Duijvestijn M. C. «TALYS-1.0» // Proceedings of the International Conference on Nuclear Data for Science and Technology. EDP Sciences, 2007. C. 211–214.
2. IAEA-Tecdoc, RIPL3, Reference Input Parameter Library, http://www-nds.iaea.org/RIPL-3
3. Experimental Nuclear Reaction Data (EXFOR), https://www-nds.iaea.org/exfor