

Present Status of Research on Optical Potential for Neutron

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Motivations of establishment of the research committee on "Unified Neutron Potential" in the Atomic Energy Society of Japan and results of discussions in the committee are presented.

1. New trends in nuclear data activity

The research on nuclear data started in old time to evaluate the basic nuclear data for nuclear reactor dynamics and operation/management of nuclear plants. These researches have been done quite actively in long-time.

Now, a large number of nuclear plants operate daily and the technical problems are considerably resolved. Present main problems may be the safety in operation of the plants, the decrease of nuclear wastes and the design of the future nuclear energy generation system.

Recently, new applications of nuclear reactions expand widely in several fields, for examples, transmutation of TRU, beam driven power systems, nuclear fusion, nuclear medicine, non-destroyed diagnostics, LSI fabrications, surface and low level analysis, space science and technology, basic sciences and so on.

These applications request, of course, new nuclear data. The region of concerned physical quantity increases widely in incident particles, target nuclei and incident energy.

2. Establishment of a research committee

In this background, a research committee on "Unified Neutron Potential" was established in the Atomic Energy Society of Japan (AESJ) from April 1994 to March 1996. This committee investigated new trends in the research on nuclear data with a focused item "neutron potential" which is the basic quantity in this field. A number of workshops are opened in Kyushu University.

After several discussions, the final report is published from the AESJ at May 1997 [1]. This report reviews the present status of research on neutron potential as follows.

- 1) Optical model, new basic problems and nuclear data,
- 2) Present status of optical model analysis
 - low energy
 - medium/high energy
 - unstable and FP nuclei
- 3) Dispersion relation in optical model analysis
- 4) Related problems
 - nuclear data
 - neutron induced experiments

- pre-equilibrium model
- topics

3. Proposals

For future study, general problems to be considered for new nuclear data are remarked as follows.

1) Accelerators

To measure required nuclear data, many accelerators are needed, while the first purposes to construct these accelerators are different and some are finished. It is impossible to measure all the required data with points-to-points.

2) Data analysis

Data already measured are not analyzed to obtain double differential cross sections, and then almost all the data should be re-measured.

3) Nuclear models

The role of nuclear theory and model becomes quite important from reasons 1) and 2).

4) Nuclear data evaluation

It is important for nuclear data evaluation groups to measure the decisive data with themselves and construct new data-bases.

5) Data from microscopic to macroscopic region

Nuclear data-bases should be provided to answer various types of requests and the required groups are not always familiar to nuclear interaction. Then, it is important to prepare data-bases as integrated and/or macroscopic shape calculated from microscopic data.

4. Future activity

It is requested strongly to continue the research in this field. Now, some projects are started to realize the next-step activities as,

- 1) establishment of a new sub-group "accelerator-beam science" in the AESJ,
- 2) realization of a forum "accelerator-beam science" at next spring meeting of AESJ,
- 3) application of the science fund to the ministry of education, science and culture, Japan as a fund of review and project, "Medium and high energy nuclear reaction data and the space-time structure", and
- 4) a plan to open a summer school for young scientists.

5. Conclusion

We propose here for many specialist groups in Japan to conduct this research co-operatively.

Reference

- [1] "Present Status of Neutron Potential –Further Development of Optical Potential Research–", the Atomic Energy Society of Japan, 1997.