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THE OPTICAL MODEL OF THE NUCLEUS.
AN INDEXED AND ABSTRACTED
LITERATURE REVIEW

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B Johansson

R Akselsson

THE OPTICAL MODEL OF THE NUCLEUS. An indexed and abstracted
literature review

av L Wallin, Å Persson, M Leimdörfer, B Johansson och R Akselsson

Antal blad 108

Summary

All available literature, dealing with optical model calculations, has been reviewed to aid in assessing suitable well parameters and to indicate when the model has been successful in predicting various nuclear data. The material investigated has been indexed according to nuclide, and short abstracts have been prepared to provide a concise summary of the contents and main results. 342 references were examined.

Sammanfattning

En litteraturgenomgång har utförts över ämnet optiska kärnmodellen. Syftet har varit att ge en överblick över de potentialparametrar, som använts vid beräkningar på olika atomkärnor i hela periodiska systemet. Denna information är avsedd att ge underlag för fortsatta beräkningar vid FOA. Korta sammandrag har iordningstänkts för varje referens för att ge den i detta sammanhang väsentligaste informationen. 342 referenser har undersökts.

Denna rapport är utsänd till:

AB Atomenergi (2 ex), Statens råd f atomforsk, Fysiska inst Uppsala, Lund, Sthlm univ och CTH, Fysik IV, KTH, Forskningsinst f fysik, Inst för teoretisk fysik Uppsala, Lund, Sthlm univ och Gbg, Prof L Hulthén, Prof N Svartholm, Gustav Werners inst f kärnkemi, Prof P O Fröman

FOA 4: 40, 41, 60, 62 (100 ex), 80, 85

Introduction:

The advance of the technologies that have grown up from nuclear science, mainly that concerned with nuclear reactors, has long been hampered by the lack of support from nuclear theory. It has been extremely difficult to make reliable predictions of data that have not been determined experimentally. During the last decade, however, the theoretical development of nuclear physics has produced methods which should be very useful for predicting unknown quantities or for performing inter- and extrapolations of experimental data. The present work was performed with the intention to facilitate a more systematic application of one of the modern tools of nuclear theory, the optical model. This model has proved very successful in the past few years in predicting angular distributions of elastically scattered particles and also of compound nucleus formation probabilities which may be used in further computations. The optical model does not, however, produce a unique and universally applicable formula, but often, a great deal of individual adjustment of parameters remains to be made for each specific problem. In the present work, we have attempted to collect all available optical model calculations in order to display what has been done on each nuclide. Special attention was given to comparisons between theory and experiment. Abstracts were prepared for each reference, giving the essential information on optical model calculations. The material is indexed according to nuclides and authors. The order between nuclides is given by their respective proton number. The abstracts appear in alphabetical order according to the first author, except for some supplementary

literature starting from ref. 308 which was collected during the last stages of the work and placed at the back (this additional material was included in the nuclide index but not in the author index)

General treatises on optical model theory will be found in the following references: 12, 36, 45, 46, 88, 89, 90, 92, 93, 94, 98, 111, 162, 170, 192, 205, 220, 254, 295, 302, 318, 323, 337, 342.