A Theoretical Investigation
of Nuclear Reactions with Neutrons.

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Gli Autori riferirono in questo «Seminario» i risultati di un loro lavoro originale, che era stato già presentato al *Nuovo Cimento* per la pubblicazione, e che comparve poi nel fascicolo di Luglio 1955 (pp. 75-89) dello stesso giornale; al quale quindi rimandiamo il lettore, mentre qui ci limitiamo a riportare il sommario. [*N. d. R.*].

Summary. — A theory of the interaction of neutrons with complex nuclei is developed with the aim of obtaining a cross-section averaged over the resonances, to be compared with the results of the phenomenological model proposed by FESHBACH, PORTER and WEISSKOPF [1]. It is shown what kind of assumptions have to be introduced in order that the compound nucleus formation give rise to an absorption of the incident beam, irrespective of what happens after the compound nucleus decay. The problem is reduced to the determination of the complex index of refraction of an indefinite nuclear matter, taking properly into account the effect of the Pauli principle. Subsequently this index of refraction has to be introduced into a one-body Schrödinger equation with the correct boundary conditions at the nuclear wall. By assuming nuclear forces which fit the low energy two-body data, and an average binding energy of 8 MeV per nucleon, an expression is derived for the absorption coefficient which is compared with the imaginary part of the FPW potential. At zero energy the absorption coefficient is just in the right range 0.03-0.05. For higher energies it becomes so large that already for 6-8 MeV the absorption is almost complete for medium sized nuclei. This agrees quite satisfactorily with experimental evidence.

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[1] H. FESHBACH, C. E. PORTHER and V. F. WEISSKOPF: *Phy. Rev.*, **96**, 448 (1954) (to be denoted in the following as FPW).