

SECTION 2 — METHODS OF NUCLEAR PHYSICS

2.1. Application of the perturbed angular correlation method to the study of the magnetism

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2.2. Some problems of lifetime measurements with Doppler shift attenuation method

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2.3. The measurement of penetration profiles of Argon ions in Tantalum using (p, gamma) reaction

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2.4. The unitary operator method in theory of slow neutron scattering by bound centers system

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Abstract: An operator suitable for treating slow neutron scattering by a system of bound centers has been derived by starting from one general expression of the unitary operator in the scattering theory. A connection of the obtained operator with the Heisenberg number density operator has been shown. The expression of slow neutron scattering cross section expressed by the correlation function has been obtained for the first Born approximation. However, this method is useful for studying the number density function or the two-body potential. The proposed method has been applied to potential and resonance neutron scattering.

The intention of this work is to introduce the number density operator in the theory of nuclear reactions, whenever the interaction of incoming particle-bound center of the system may be described as a two body potential. Some informations about the number density, correlation function or the two body potential may be obtained by the interpretation of the experimental results. The use of this operator has been illustrated in the case of slow neutron scattering treating the potential and the resonance scattering.

Let the Hamiltonian of the whole system be

$$H = H_0 + V, \tag{1}$$