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DATE: May 8, 1986
TO: Distribution
FROM: V. McLane *vm*
SUBJECT: Thermal Neutron Scattering

In looking at the slow neutron scattering data coded in EXFOR, we have found quite a few problems and inconsistencies. Two major problems are outlined:

Paramagnetic Scattering

For the rare earths paramagnetic scattering is a major contribution to the scattering cross section. In most cases experimentalists have corrected for this effect and present a bound atom cross section which is the difference between the total measured scattering cross section and the paramagnetic scattering cross section. These have not always been differentiated or compiled correctly.

Bound Atom Scattering

For other elements at thermal energies, the total scattering cross section is equivalent to the bound atom scattering cross section. This has resulted in many different codes being used for the same quantity.

Examples: (N,THS),BA
(N,SCT)
(N,EL)

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|------------|------------------|------------------|
| <i>cc.</i> | <i>Arcilla</i> | <i>Ohamoto</i> |
| | <i>Kullen</i> | <i>Oshomuvwe</i> |
| | <i>Bandaries</i> | <i>Schmidt</i> |
| | <i>Goalo</i> | <i>Schweser</i> |
| | <i>Lammer</i> | <i>Seits</i> |
| | <i>Lummel</i> | |

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Thermal Neutron Scattering

We would like to offer the following proposals for coding to try to aim for consistency of definition. We prefer the first solution.

Proposal 1:


(N,THS),PM+	total thermal scattering where paramagnetic effects are included.
(N,THS)	total thermal scattering (paramagnetic effects effects not included) = bound atom scattering.
(N,EL)	free atom scattering.
(N,THS),COH	coherent part of bound atom scattering.
(N,THS),INC	incoherent part of bound atom scattering.

This proposal suggests the removal of the codes FA and BA from the branch field and the addition of the code PM+.

Proposal 2:

(N,THS)	total thermal scattering (includes crystalline and paramagnetic effects).
(N,THS),BA	thermal scattering with paramagnetic scattering not included.
(N,EL)	free atom scattering.
(N,THS),BA/COH	coherent part of bound atom scattering.
(N,THS),BA/INC	incoherent part of bound atom scattering.

This proposal suggests the removal of the code FA from the branch field.


Charles L. Dunford

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