

NATIONAL NUCLEAR DATA CENTER  
Bldg. 197D  
Brookhaven National Laboratory  
P. O. Box 5000  
Upton, NY 11973-5000 U.S.A.

(Internet) "NNDC@BNL.GOV  
(Hepnet) BNL::NNDC

Telephone: (516)344-2902  
FAX: (516)344-2806

Memo CP-C/217

DATE: May 16, 1996  
TO: Distribution  
FROM: V.McLane  
SUBJECT: Polarization

Please modify the following entries

Dictionary 34

AYY Tensor analyzing power, incident projectile spin normal to scattering plane

Please add the following codes to the EXFOR Dictionaries.

Dictionary 34

Archive equiv.

AZZ	Tensor analyzing power, incident projectile spin parallel to scattering plane	32
CLL	Spin correlation function, target and beam spins parallel to beam direction in scattering plane	33
CLS	Spin correlation function, beam spin parallel, target spin perpendicular, to beam direction in scattering plane	33
CNN	Spin correlation function, target and beam spins normal to scattering plane	33
CSL	Spin correlation function, beam spin perpendicular, target spin parallel, to beam direction in scattering plane	33
CSS	Spin correlation function, target and beam spins perpendicular to beam direction in scattering plane	33
DSP	Spins parallel minus spins antiparallel	36
KLL	Spin transfer parameter, target and beam spins parallel to beam direction in scattering plane	33
KLS	Spin transfer parameter, beam spin parallel, target spin perpendicular, to beam direction in scattering plane	33

cc. Arcilla  
Lammer  
Lemuel  
Ostozinsky  
Pashchenko  
Schworer  
Wienke

KNN	Spin transfer parameter, target and beam spins normal to scattering plane	33
KSL	Spin transfer parameter, beam spin perpendicular, target spin parallel, to beam direction in scattering plane	33
KSS	Spin transfer parameter, target and beam spins perpendicular to beam direction in scattering plane	33

Dictionary 36

,POL/DA,,AZZ	Tensor analyzing power, incident projectile spin parallel to scattering plane
,POL/DA,,CLL	Spin correlation function, target and beam spins parallel to beam direction in scattering plane
,POL/DA,,CLS	Spin correlation function, beam spin parallel, target spin perpendicular, to beam direction in scattering plane
,POL/DA,,CNN	Spin correlation function, target and beam spins normal to scattering plane
,POL/DA,,CSL	Spin correlation function, beam spin perpendicular, target spin parallel, to beam direction in scattering plane
,POL/DA,,CSS	Spin correlation function, target and beam spins perpendicular to beam direction in scattering plane
,POL/DA,,KLL	Spin transfer parameter, target and beam spins parallel to beam direction in scattering plane
,POL/DA,,KLS	Spin transfer parameter, beam spin parallel, target spin perpendicular, to beam direction in scattering plane
,POL/DA,,KNN	Spin transfer parameter, target and beam spins normal to scattering plane
,POL/DA,,KSL	Spin transfer parameter, beam spin perpendicular, target spin parallel, to beam direction in scattering plane
,POL/DA,,KSS	Spin transfer parameter, target and beam spins perpendicular to beam direction in scattering plane
,SIG,,DSP	Cross section for spins antiparallel minus cross section for spins parallel

Attached is a discussion of the parameters used. I will incorporate these into a LEXFOR entry and transmit it later this month.

Distribution:

M. Chiba, Sapporo  
 F. E. Chukreev, CaJaD  
 K. Kato, JCPDG  
 H. D. Lemmel, NDS  
 V. N. Manokhin, CJD  
 O. Schwerer, NDS

F. T. Tárkányi, Debrecen  
 N. Tubbs, NEADB  
 Y. Tendow, RIKEN  
 V. Varlamov, CDFE  
 Zhang Zingshang, CNDC  
 NNDC (3)

## Discussion of polarization parameters

The following are all measured for polarized beam and polarized target:

The following subscripts are defined:

$i$  refers to the beam

$t$  refers to the target

$N$  is normal to the scattering plane

$L$  is longitudinal along the incident-beam direction

$S = N \times L$  in the scattering plane

$Y$  is the normalized yield,

**Analyzing Power Asymmetry:**

$$\epsilon_i = \frac{Y_{i+} - Y_{i-} + Y_{i+} - Y_{i-}}{Y_{i+} + Y_{i-} + Y_{i+} + Y_{i-}}$$

$$\epsilon_t = \frac{Y_{t+} - Y_{t-} - Y_{t+} + Y_{t-}}{Y_{t+} + Y_{t-} + Y_{t+} + Y_{t-}}$$

**Spin-Correlation Asymmetry:**

$$\epsilon_{it} = \frac{Y_{i+} + Y_{t-} - Y_{t+} - Y_{i-}}{Y_{i+} + Y_{t-} + Y_{t+} + Y_{i-}}$$

**Spin-Correlation Analyzing Power:** relative difference in cross sections for the corresponding spin up vs. spin down.

$$A_i = \frac{1}{P_i} \frac{Y_{i+} - Y_{i-} + Y_{i+} - Y_{i-}}{Y_{i+} + Y_{i-} + Y_{i+} + Y_{i-}} = \frac{\epsilon_i}{P_i}$$

$$A_t = \frac{1}{P_t} \frac{N_{t+} - N_{t-} - N_{t+} + N_{t-}}{N_{t+} + N_{t-} + N_{t+} + N_{t-}} = \frac{\epsilon_t}{P_t}$$

**Spin-Correlation Parameter**

$C_{it}$ : cross section is measured.

$$C_{it} = \frac{d\sigma/d\Omega_{i+} + d\sigma/d\Omega_{i-} - d\sigma/d\Omega_{t+} - d\sigma/d\Omega_{t-}}{d\sigma/d\Omega_{i+} + d\sigma/d\Omega_{i-} + d\sigma/d\Omega_{t+} + d\sigma/d\Omega_{t-}} = \frac{1}{P_i P_t} \frac{Y_{i+} + Y_{t-} - Y_{t+} - Y_{i-}}{Y_{i+} + Y_{t-} + Y_{t+} + Y_{i-}}$$

$C_{LL}$ : L-type beam, L-type target

$C_{LS}$ : L-type beam, S-type target

$C_{NN}$ : N-type beam; N-type target

$C_{SL}$ : S-type beam, L-type target

$C_{LL}$ : L-type beam; L-type target

### Spin-Transfer Parameter

$K_{ij}$ : polarization is measured

$$K_{it} = \frac{P_t}{B_i}$$

where  $B_i$  is the  $i$  component of the incident beam.

**Cross section for spins parallel minus cross section for spins antiparallel**

$\Delta\sigma$ :

$$\Delta\sigma = \sigma_{\uparrow\downarrow} - \sigma_{\uparrow\uparrow}$$