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Memo CP-E/067

Date: March 24, 2005
To: Distribution
From: OTSUKA Naohiko
Subject: Polarization quantities
Reference: CP-E/064, CP-C/353 (Rev.), CP-D/320

1) Expansion of branch LL, LS, NN, SL, SS and NL

I propose corrections of expansions for branch codes LL, LS, NN, SL, SS and NL (as a complement of CP-E/064).

Dictionary 31 (Branch codes)

LL	Longitudinal-longitudinal (zz) component
LS	Longitudinal-sideward (zx) component
NN	Normal-normal (yy) component
SL	Sideward-longitudinal (xz) component
SS	Sideward-sideward (xx) component
NL	Normal-longitudinal (yz) component (Proposed in CP-C/353, see below)

2) Spin correlation parameter or tensor analyzing power?

CP-C/353 Rev. proposed "NL,POL/DA,,ANA" with "spin correlation parameter A(NL)". We have similar codes "*ij*,POL/DA,,ANA" (*i*, *j*=S, N, L). These are expanded as "spin correlation parameter A(*ij*)", however often applied to "tensor analyzing power". We must distinguish between these two quantities.

CP-C/353 is prepared for "D.L. Adams *et al*., Nucl. Phys. **A480** (1988)530" (=C0786 in TRANS.C071) which measures "spin correlation parameter". Therefore the proposed expansion is correct for this reference. I am not against the addition of "NL,POL/DA,,ANA" with "spin correlation parameter A(NL)" into dictionary 36 as a temporally step in order to keep consistency with other similar codes. However investigation into existing entries and update of LEXFOR entry are necessary. Use of "ANA" for "spin correlation parameter" may be misleading.

We have good LEXFOR entry for polarization quantities. However sometimes compilers specify quantity codes by symbols used in articles. *Compilers should specify quantity codes not by symbols but by definitions, because there may be various notations for one quantity (as shown in Table 1).*

Table 1: Typical polarization quantities and corresponding EXFOR quantity codes

Quantity	Setup[1)]	Typical symbol [2)]	EXFOR code (for d/dA)
Polarization	$A(\vec{b},\vec{c})D$	$\boldsymbol{P_y}$	,POL/DA …
	$A(b,c)\vec{D}^{*)}$		
Vector analyzing power (spin ≥ 1/2)	$A(\vec{b},c)D$	$\boldsymbol{A_y}$, A_{00n0}, …	,POL/DA,,ANA …
		$\boldsymbol{iT_{11}}$, …	,POL/DA,,VAP …
	$\vec{A}(b,c)D^{*)}$	A_{000n}, …	
Tensor analyzing power (spin ≥1, deuteron etc.)	$A(\vec{b},c)D$	$\boldsymbol{A_{yy}}$, …	NN,POL/DA,,ANA (!)…
		$\boldsymbol{T_{20}}$, …	20,POL/DA,,TAP …
	$\vec{A}(b,c)D^{*)}$		
Initial state spin correlation Parameter	$\vec{A}(\vec{b},c)D$	A_{yy}, A_{NN}, A_{nn}, $\boldsymbol{C_{NN}}$, $C_{y,y}$, A_{00nn} ,…	NN,POL/DA,,ANA (!)…
Final state spin correlation Parameter	$A(\vec{b},\vec{c})\vec{D}^{*)}$	C_{nn}, C_{NN}, $C_{n,n}$, C_{nn00} , …	NN,POL/DA,,C …
Spin rotation-depolarization parameter	$A(\vec{b},\vec{c})D$	D, $\boldsymbol{D_{NN}}$, $\boldsymbol{K_y^{y'}}$, D_{n0n0}, …	NN,POL/DA,,D …
	$\vec{A}(b,c)\vec{D}^{*)}$	D_{NN}, D_{0n0n}, …	
Spin transfer parameter	$\vec{A}(b,\vec{c})D^{*)}$	K_{n00n}, …	
	$A(\vec{b},c)\vec{D}^{*)}$	D_t, K_{NN}, K_{0nn0}, …	NN,POL/DA,,K …

*) Rarely measured [2)] *y* or *yy* component for the most part. Bold means "often used".

[1)] $\vec{A}$: Polarized target used (POLTR in INC-SOURCE)

$\vec{b}$: Polarized beam used (POLNS or POLIS in INC-SOURCE)

$\vec{c}$: Polarization of detected outgoing particle and measured (DSCAT in METHOD)

$\vec{D}$: Polarization of detected recoil measured (DSCAT in METHOD)

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