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To: Distribution
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Subject: Differential cross section for 4-momentum transfer squared

According to the action list of the last NRDC meeting, I prepared a summary of codes and LEXFOR entry for differential cross section for 4-momentum transfer squared. Relevant codes are summarized below.

Dictionary	Code	Dimension	Reaction type	CINDA quantity	Web quantity
24 (Data Headings)	$-\tau$	EC2			
25 (Units)	GEV2/C2	EC2			
	MB/GEV2/C2	D4			
26 (Family flag)	EC2 (*) , D4				
32 (Parameters)	DT				
213 (Reaction type)	DT			DT	DA
236 (Quantity))	, DT	D4	DT		

(*) Not in dictionary, must be defined.

Dictionary 24 (Data Headings)

We need a new data type (I2) for 4-momentum transfer squared. Usually this differential cross section is given for elastic scattering, for which 4-momentum transfer squared depends on scattering angle (See LEXFOR entry proposal). Therefore I would like to propose a new **data type “69”** for 4-momentum transfer squared. Data heading $-\tau$ is for a simple independent variable. Therefore **plotting flags (I7) “1000000”** is proposed.

Dictionary 26 (Family flag)

Family code EC2 in dictionary 24 and 25 must be defined in dictionary 26.

EC2 2425 4-momentum transfer squared

Dictionary 213 (Reaction type)

Differential cross section for 4-momentum transfer squared requires $-t$ as an independent variable. I proposed data type “69” for $-t$ for dictionary 24. Therefore we need **independent variable family code “4”** (=the first digit of data type minus 2, as mentioned in the last page of dictionary manual - IAEA-NDS-213 August 2007).

Below is a proposed LEXFOR entry for “Secondary 4-momentum transfer distribution”.

LEXFOR entry: Secondary 4-momentum transfer distribution

Below is an explanation of differential cross section for 4-momentum transfer squared, to be added into LEXFOR entry “Differential data”.

Secondary Energy Distributions ($d\sigma/dE'$)

...

Secondary Momentum Distributions ($d\sigma/dp'$)

1. Linear momentum distribution: probability for a particle to be emitted with a given

...

2. Linear momentum distribution for a correlated pair: Probability that a particle a and a particle

...

Secondary 4-momentum transfer distributions ($d\sigma/dt$)

Probability for a particle to be emitted with a given 4-momentum transfer squared t ; given as $\sigma(t) = d\sigma/dt$, where 4-momentum transfer squared of the particle is defined by $t = (E' - E)^2 - (\vec{p}' - \vec{p})^2$ for scattering of the particle $(E, \vec{p}) \rightarrow (E', \vec{p}')$. Note that t is a Lorentz scalar, and $t = -4p^2 \sin^2(\theta/2) < 0$ for elastic scattering and $t = -4EE' \sin^2(\theta/2) < 0$ for relativistic limit. The data are given in units of cross section per unit of 4-momentum squared (e.g., mb/(GeV/c)²).

REACTION coding: DT in SF6.

Unit type: D4 (e.g., MB/GEV²/C²)

The 4-momentum transfer squared is given under the data heading $-t$ with the opposite sign.

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