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Memo CP-D/407

Date: 2 August 2004
To: Distribution
From: O. Schwerer

Subject: **EXFOR compilation scope**

Reference: CP-A/156, CP-C/336, CP-D/385, CP-A/151, CP-E/043, CP-C/343

The criteria proposed by Vicki McLane in CP-C/343 (incident-projectile energies up to 1 GeV, incident charged particles from A=1-12, excluding "fundamental" particles) are a suitable basis for discussion. But we must realize that they are not only (as she said herself) arbitrary; they exclude many data already compiled long ago, partly even at NNDC.

This does not mean that this or a similar cut-off for compulsory compilation should not be introduced, but it needs careful consideration, and a few more questions to be answered. The criteria of CP-C/343 are not sufficient for a practical solution.

While I agree that the scope of compulsory compilation needs to be defined more clearly, I agree also with V. McLane that no center needs to stop compilation of any data they want to compile. We just need to find a suitable way to flag such data so centers which are (perhaps only at present) not interested in them can keep them outside their database.

Apart from worrying about the size of the database, my concerns are the following:

- What are the priorities? Should the network more explicitly give priority to low and medium energy data which are needed for applications today?
- What about new dictionary codes and LEXFOR definitions for quantities specific for e.g. high energy data? Who will check their consistency and who will write the appropriate LEXFOR entries? I do not feel that e.g. I myself have the expertise for this.
- What to do with (perhaps) many "borderline" works (e.g. excitation functions from 100 MeV to 10 GeV, or works containing both "normal" and "exotic" quantities). Also, special consideration is needed for "inverse reactions" (e.g. heavy ion projectile on hydrogen target).
- Where is the end? I do agree with Vicki that also the scope of these "additional" data must be defined. There are limits set by the format, the expertise of the compilers, and the needs and expectations of the user community.

- What do we do with data outside the agreed range which are already in the file (see below)? Should they get new accession numbers?

These questions should be answered at the NRDC meeting, so that all centers can compile the data they need within an agreed framework.

Data above 1 GeV and heavy ion data already in EXFOR

NNDC recently excluded some transmitted entries from their database because of high energy or very heavy ion projectiles. This is of course perfectly all right, but for the sake of clarity in the discussion we should remember that the NNDC database contains, since many years, many data for energies > 1 GeV and many data for heavy ions with $A > 12$, some of them compiled at NNDC. (This is why I put question marks on these criteria in my earlier memo on this topic, CP-D/385).

Therefore the appearance of high energy and heavy ion data in EXFOR is by no means new (new is only the appearance of "unusual" projectiles such as pions, but there are only a few entries so far). Many years ago, we even introduced linear momentum (MOM) as an alternative to the incident particle energy (EN), given in GEV/C or MEV/C, a representation typical for high energy data.

The NNDC EXFOR database (as of 30 July 2004) contains 346 entries with 9620 subentries having data which are totally or partly above 1 GeV.

It also contains data for the following incident heavy ions with $A > 12$:

Ne-19,20,22; Mg-24,26; Al-27; Si-28,30; S-32,34; Cl-35,37; Ar-40; Ca-40,44,48; Cr-54; Fe-56,58; Ni-58,60,64; Cu-63; Ge-74,76; Se-82; Kr-84; Sn-112; Xe-129,132,136; N-14,15; Au-197; O-16,17,18; Pb-208; F-17,18,19; U-238

(I used the NNDC database for this search of such data already in our databases, in order to exclude those recently transmitted data which were not added to the NNDC file.)

Entries compiled at NNDC: There are 17 neutron data (Area 1) entries (all works before 1977) and 78 CPND (Area C) entries with 417 subentries (some of them compiled in the past years) with energies > 1 GeV. There are many heavy ion data in Area C, including projectiles with $A > 12$. As an example, these are some of the entries containing exclusively data for $A > 12$ projectiles: C0407, C0410, C0422, C0468.

Proposal

Coming back to my proposal of CP-D/385, we could have these 4 categories of data:

A - Compulsory compilation. For this, I think Vicki's criteria (1GeV, projectiles with $A < 13$) can be used.

B - Voluntary (lower priority data): Transmitted on regular TRANS files but compilation voluntary. This would include

- data with EN-MIN > 1 GeV. In view of the fact (see above) that many such data are already in the database as part of ordinary transmissions, I am inclined to support F. Chukreev's suggestion to flag them with a special flag e.g. in the BIB record, rather than using a separate Center Identification Character, provided that the quantities are already in the dictionary or can be added without major implications for the system.
- Data for "very heavy" ions (A>12). Same treatment as for high energy data
- Exotic quantities such as Vector and Tensor Polarization data

C - Separate transmission (different Center Identification Character) could be introduced for exotic projectiles such as pions, antiprotons etc. I think here this is practical because these projectiles are easy to sort out.

D - Data not to be compiled in EXFOR (e.g. nuclear structure data, theoretical data, ...)

It would be understood that

- The network and its coordinator would aim at complete coverage of category A data. (Note that this is already an extension - heavy ions with $6 < A < 12$ were not completely covered so far.) Categories B and C would be compiled as additions (as it was in the past for all CPND).
- Each center will announce its compilation scope to the network. Also the scope for separate transmissions (category C) must be defined and agreed.
- Those centers compiling data in categories B and C will take the responsibility of proposing new dictionary codes, writing new LEXFOR entries, and checking the correctness and consistency of their compilations. All data must be compatible with the basic format requirements so that they can be processed at NDS the same way as category A data. NDS will check category B and C data only for formal correctness (without obligation to make changes in any programs such as the check program) and will keep and distribute all data transmitted within the agreed scopes of categories A, B and C.

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