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**Memo CP-D/521**

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**To:** Distribution  
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**Subject: Total / elastic cross sections compiled in EXFOR CPND entries**

In charged-particle induced reaction, angular differential cross section diverges at the most forwarded angle because of long-range character of Coulomb interaction. Therefore elastic scattering cross section and total cross section are infinity for charged-particle induced reactions. In EXFOR, however, about 150 subentries give total or elastic scattering cross section for charged-particle induced reaction. Several cases were analyzed and we found the following cases:

- 1) Total reaction cross section (=non-elastic) is wrongly compiled as total cross section;
- 2) Nuclear interaction part of total or elastic scattering cross section is given;
- 3) Non-elastic cross section is wrongly compiled as elastic;
- 4) Differential elastic scattering cross section integrated in angle range excluding angles near 0 degree is compiled as total elastic scattering cross section.

We would ask CPND centres to check subentries which have SF3=TOT or EL and SF6=SIG. All relevant subentries are listed below. If there is certain number of the 2<sup>nd</sup> case (only nuclear interaction part determines the cross section), we can add a new branch code (e.g. NUC) in for SF5, understanding that this is model derived (and dependent) quantity.

## List of total and elastic cross sections for charged-particle induced reaction data

### 1. Total cross section (32 entries, 95 subentries)

Subentry	Pt.	REACTION
A0493.002	T	(2-HE-4(P,TOT),,SIG)
A0493.003	T	(2-HE-6(P,TOT),,SIG)
A0493.004	T	(2-HE-8(P,TOT),,SIG)
A0545.007		(42-MO-94(A,TOT),,SIG,,CALC)
A0545.008		(47-AG-107(A,TOT),,SIG,,CALC)
A0545.009		(50-SN-116(A,TOT),,SIG,,CALC)
A0545.010		(50-SN-122(A,TOT),,SIG,,CALC)
A0545.011		(50-SN-124(A,TOT),,SIG,,CALC)
A1261.002		(2-HE-3(P,TOT),,SIG,,EXP)
A1261.003		(2-HE-4(P,TOT),,SIG,,EXP)
C0318.004		(22-TI-48(A,TOT),,SIG,,CALC)
C0318.005		(23-V-51(A,TOT),,SIG,,CALC)
C0919.002		(14-SI-28(A,TOT),,SIG)
C0919.003		(14-SI-28(2-HE-6,TOT),,SIG)
C0919.004		(14-SI-28(2-HE-8,TOT),,SIG)
C0919.005		(14-SI-28(3-LI-6,TOT),,SIG)
C0919.006		(14-SI-28(3-LI-7,TOT),,SIG)
C0919.007		(14-SI-28(3-LI-8,TOT),,SIG)
C0919.008		(14-SI-28(3-LI-9,TOT),,SIG)
C0919.009		(14-SI-28(3-LI-11,TOT),,SIG)
C0919.010		(14-SI-28(4-BE-10,TOT),,SIG)
C1232.002		(4-BE-9(P,TOT),,SIG)
C1232.003		(6-C-0(P,TOT),,SIG)
C1232.004		(13-AL-27(P,TOT),,SIG)
C1232.005		(29-CU-0(P,TOT),,SIG)
C1232.006		(74-W-0(P,TOT),,SIG)
C1232.007		(82-PB-0(P,TOT),,SIG)
C1299.025		(39-Y-89(P,TOT),,SIG)
D0230.003		(26-FE-54(D,TOT),,SIG)
D0230.009		(26-FE-56(D,TOT),,SIG)
D0230.015		(26-FE-58(D,TOT),,SIG)
D0230.021		(28-NI-60(D,TOT),,SIG)
D0258.005		(30-ZN-64(2-HE-6,TOT),,SIG,,DERIV)
D0258.006		(30-ZN-64(A,TOT),,SIG,,DERIV)
D0409.003		(6-C-12(8-O-16,TOT),,SIG)
D5001.002		(28-NI-58(HE3,TOT),,SIG)
D5001.003		(28-NI-64(HE3,TOT),,SIG)
D6010.011		(49-IN-115(6-C-12,TOT),,SIG)
D6035.006		(82-PB-208(5-B-11,TOT),,SIG,,CALC)
D6035.007		(83-BI-209(5-B-11,TOT),,SIG,,CALC)
E1567.002		(6-C-12(D,TOT),,SIG)
E1567.003		(13-AL-27(D,TOT),,SIG)
E1567.004		(1-H-2(D,TOT),,SIG)

E1583.002		(1-H-2(D,TOT),,SIG)
F0093.011		(5-B-10(P,TOT)5-B-10,,SIG,,EXP)
F0286.002		(5-B-11(P,TOT),,DA,,4PI,EXP)
F0286.004		(5-B-11(P,TOT),,DA,,4PI,EXP)
F0561.002		(40-ZR-90(A,TOT),,SIG)
F0561.003		(40-ZR-90(HE3,TOT),,SIG)
F0579.002		(13-AL-27(D,TOT),,SIG)
F0579.003		(26-FE-0(D,TOT),,SIG)
F0579.004		(27-CO-59(D,TOT),,SIG)
F0579.005		(28-NI-0(D,TOT),,SIG)
F0579.006		(28-NI-60(D,TOT),,SIG)
F0579.007		(28-NI-64(D,TOT),,SIG)
F0579.008		(29-CU-63(D,TOT),,SIG)
F0579.009		(29-CU-65(D,TOT),,SIG)
F0579.010		(30-ZN-0(D,TOT),,SIG)
F0579.011		(47-AG-0(D,TOT),,SIG)
F0766.002		(14-SI-28(A,TOT),,SIG)
F0768.006		(40-ZR-90(A,TOT),,SIG)
F0768.007		(40-ZR-90(HE3,TOT),,SIG)
F0769.003		(14-SI-28(A,TOT),,SIG)
F0769.004		(14-SI-28(2-HE-6,TOT),,SIG)
F0773.002		(14-SI-28(A,TOT),,SIG)
O0194.005		(92-U-233(P,TOT),,SIG,,EXP)
O0194.006		(92-U-235(P,TOT),,SIG,,EXP)
O0194.007		(92-U-238(P,TOT),,SIG,,EXP)
O0561.002		(1-H-1(P,TOT),,SIG)
O0561.003		(1-H-2(P,TOT),,SIG)
O0561.004		(2-HE-4(P,TOT),,SIG)
O0561.005		(4-BE-9(P,TOT),,SIG)
O0561.006		(6-C-12(P,TOT),,SIG)
O0561.007		(8-O-16(P,TOT),,SIG)
O0633.002		(47-AG-CMP(P,TOT),,SIG,,EXP)
O0700.002		(92-U-233(P,TOT),,SIG)
O0700.003		(94-PU-239(P,TOT),,SIG)
O0745.002		(2-HE-4(P,TOT),,SIG)
O0745.003		(6-C-12(P,TOT),,SIG)
O0745.004		(8-O-16(P,TOT),,SIG)
O0837.005		(6-C-12(P,TOT),,SIG)
O0837.006		(41-NB-93(P,TOT),,SIG)
O0837.007		(82-PB-0(P,TOT),,SIG)
O1296.015		(14-SI-0(P,TOT),,SIG)
O1296.016		(14-SI-0(A,TOT),,SIG)
T0116.003	2	((58-CE-0(P,F),,SIG)/ (58-CE-0(P,TOT),,SIG,,CALC))
T0116.005	2	((63-EU-0(P,F),,SIG)/ (63-EU-0(P,TOT),,SIG,,CALC))
T0116.006	2	((65-TB-159(P,F),,SIG)/ (65-TB-159(P,TOT),,SIG,,CALC))
T0116.008	2	((67-HO-165(P,F),,SIG)/ (67-HO-165(P,TOT),,SIG,,CALC))
T0116.010	2	((69-TM-169(P,F),,SIG)/ (69-TM-169(P,TOT),,SIG,,CALC))

T0116.012	2	((79-AU-197(P,F),,SIG)/ (79-AU-197(P,TOT),,SIG,,CALC))
T0116.014	2	((92-U-0(P,F),,SIG)/ (92-U-0(P,TOT),,SIG,,CALC))
T0118.002		((59-PR-141(P,F),,SIG)/ (59-PR-141(P,TOT),,SIG,,CALC))
T0118.003		((71-LU-0(P,F),,SIG)/ (71-LU-0(P,TOT),,SIG,,CALC))
T0118.004		((83-BI-209(P,F),,SIG)/ (83-BI-209(P,TOT),,SIG,,CALC))

## 2. Elastic cross section (28 entries, 59 subentries)

Subentry	Pt.	REACTION
A0493.002	E	(2-HE-4(P,EL)2-HE-4,,SIG)
A0493.003	E	(2-HE-6(P,EL)2-HE-6,,SIG)
A0493.004	E	(2-HE-8(P,EL)2-HE-8,,SIG)
A1195.002		(1-H-2(A,EL)1-H-2,,SIG,,EXP)
C0040.004		(2-HE-4(D,EL)2-HE-4,,SIG)
C0885.003		(20-CA-40(A,EL)20-CA-40,,SIG,,AV)
C0885.005		(20-CA-44(A,EL)20-CA-44,,SIG,,AV)
C0962.003		(29-CU-63(P,EL)29-CU-63,,SIG)
C0962.006		(29-CU-65(P,EL)29-CU-65,,SIG)
C1048.002		((1-H-1(9-F-18,EL)1-H-1,,SIG,,REL)= (9-F-18(P,EL)9-F-18,,SIG,,REL))
C1159.003	2	(39-Y-89(P,EL)39-Y-89,,SIG)
C1159.006	2	(39-Y-89(D,EL)39-Y-89,,SIG)
C1211.002		(6-C-0(P,EL)6-C-0,,SIG)
C1211.003		(13-AL-27(P,EL)13-AL-27,,SIG)
C1211.004		(29-CU-0(P,EL)29-CU-0,,SIG)
C1211.005		(47-AG-0(P,EL)47-AG-0,,SIG)
C1211.006		(82-PB-0(P,EL)82-PB-0,,SIG)
C1212.002		(24-CR-0(P,EL)24-CR-0,,SIG)
C1212.005		(26-FE-0(P,EL)26-FE-0,,SIG)
C1212.008		(27-CO-59(P,EL)27-CO-59,,SIG)
C1212.011		(28-NI-0(P,EL)28-NI-0,,SIG)
C1212.014		(29-CU-0(P,EL)29-CU-0,,SIG)
C1212.017		(30-ZN-0(P,EL)30-ZN-0,,SIG)
C1212.020		(32-GE-0(P,EL)32-GE-0,,SIG)
C1215.003	1	(6-C-0(P,EL)6-C-0,,SIG,,DERIV)
C1220.003		(2-HE-4(P,EL)2-HE-4,,SIG)
C1220.005		(6-C-12(P,EL)6-C-12,,SIG)
C1220.007		(8-O-16(P,EL)8-O-16,,SIG)
C1360.003		(6-C-12(A,EL)6-C-12,,SIG)
C1492.006		(6-C-12(3-LI-6,EL)6-C-12,,SIG)
C1492.007		(6-C-13(3-LI-6,EL)6-C-13,,SIG)
C1492.008		(4-BE-9(3-LI-7,EL)4-BE-9,,SIG)
C1492.009		(6-C-13(3-LI-7,EL)6-C-13,,SIG)
D0201.002		(1-H-1(2-HE-6,EL)1-H-1,,SIG)
D0214.004		(28-NI-58(A,EL)28-NI-58,,SIG)
D0214.007		(50-SN-116(A,EL)50-SN-116,,SIG)

D0214.010	(82-PB-208(A,EL)82-PB-208,,SIG)
D0410.005	(5-B-10(5-B-10,EL)5-B-10,,SIG,,DERIV)
D0410.006	(5-B-11(5-B-10,EL)5-B-11,,SIG,,DERIV)
D0410.007	(5-B-11(5-B-11,EL)5-B-11,,SIG,,DERIV)
F0002.003	(3-LI-6(HE3,EL)3-LI-6,,SIG,,CALC)
F0063.003	(3-LI-6(P,EL)3-LI-6,,SIG,,EXP)
F0455.005	(4-BE-9(HE3,EL)4-BE-9,,SIG,,CALC)
F0578.004	(12-MG-24(P,EL)12-MG-24,,SIG)
F0583.002	(4-BE-9(A,EL)4-BE-9,,SIG,,REL)
F0902.005	(34-SE-82(P,EL)34-SE-82,,SIG)
F0902.006	(34-SE-80(P,EL)34-SE-80,,SIG)
F0902.007	(34-SE-78(P,EL)34-SE-78,,SIG)
O0455.006	(6-C-12(P,EL)6-C-12,,SIG)
O0455.007	(13-AL-27(P,EL)13-AL-27,,SIG)
O0455.008	(26-FE-0(P,EL)26-FE-0,,SIG)
O0455.009	(47-AG-0(P,EL)47-AG-0,,SIG)
T0269.004	(14-SI-28(A,EL)14-SI-28,,SIG)

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