B-14951

Calibration Information for Experiments 71-063A-10 and 72-031A-09

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This document consists of a temperature correction procedure supplied by Dr. Paul Bjockholm of American Science and Engineering, Inc., Cambridge, Massachusetts

TEMPERATURE CORRECTIONS

In order to overlay data from different detectors and temperatures, it is necessary to compensate for gain and bias differences. An alpha particle of energy E stopping in the i^{th} detector produces a count in channel number N according to the formula

$$N = (E - B(i, T))/G(i, T) - 256$$

where the gain of the i^{th} detector at temperature T if fitted to the quadratic form

$$G(i, T) = G_0(i) + G_1(i)\,T + G_2(i)\,T^2$$

and the bias is

$$B(i, T) = B_0(i) + B_1(i)\,T + B_2(i)\,T^2$$

The coefficients G_0, G_1, etc. were calculated from data obtained in laboratory tests using Am^{241} (E = 5.486 Mev) and Cm^{242} (E = 6.115) test sources. The values obtained are given in Table III. The temperature, measured in °C, was monitored by averaging the readings of two sensors attached to the cases of detectors 5 and 6. There is also available a temperature measurement at the low voltage power supply.

TABLE III Temperature Correction Coefficients

A. Apollo 15

DET	G0	G1	G2
1	.016511	1.11682E-5	1.20094E-8
2	1.63657E-2	3.6829E-6	8.69821E-7
3	1.68476E-2	1.52701E-5	-1.94532E-7
4	.0162362	6.8508E-6	8.04508E-7
5	1.65868E-2	8.1722E-6	4.30857E-7
6	1.67374E-2	1.38262E-5	-9.95569E-8
7	1.66394E-2	8.02561E-6	5.14025E-7
8	1.69597E-2	1.1784E-5	1.29059E-8
9	.0160482	6.30958E-6	1.3558E-6
10	.016149	5.07239E-6	1.4812E-6

DET	B0	B1	B2
1	.454456	-2.41821E-3	9.97633E-5
2	.490183	-6.31298E-4	-1.51483E-4
3	.366534	-3.30801E-3	1.44618E-4
4	.52963	-6.33949E-4	-1.45574E-4
5	.449883	-1.09982E-3	-5.301E-5
6	.405481	-1.70306E-3	8.27464E-5
7	.422976	-1.63199E-3	-3.81668E-5
8	.344155	-3.29596E-3	8.34875E-5
9	.593791	-9.17572E-4	-2.99902E-4
10	.579663	-1.23281E-3	-3.34881E-4

B. Apollo 16

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B0(1) = 3.23599E-01     B0(2) = 4.84999E-01     B0(3) = 4.02099E-01
B0(6) = 2.09999E-03     B0(7) = 3.20999E-01     B0(8) = 3.89899E-01
B1(1) = 8.89399E-03     B1(2) = 2.13199E-03     B1(3) =-9.74999E-04
B1(6) =-8.87499E-03     B1(7) = 8.69499E-03     B1(8) =-2.26199E-03
B2(1) = 0.00000E+00     B2(2) =-2.71499E-04     B2(3) =-1.53099E-05
B2(6) = 5.86799E-04     B2(7) = 0.00000E+00     B2(8) =-6.74099E-05
G0(1) = 1.67799E-02     G0(2) = 1.63499E-02     G0(3) = 1.66299E-02
G0(6) = 1.78699E-02     G0(7) = 1.70899E-02     G0(8) = 1.66499E-02
G1(1) =-1.42899E-05     G1(2) =-5.79999E-06     G1(3) = 6.61199E-06
G1(6) = 3.17799E-05     G1(7) =-1.86499E-05     G1(8) = 9.49499E-06
G2(1) = 0.00000E+00     G2(2) = 1.17399E-06     G2(3) = 3.47299E-07
G2(6) =-1.63799E-06     G2(7) = 0.00000E+00     G2(8) = 4.97799E-07
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B0(4) = 2.97099E-01     B0(5) = 3.4799E-01
B0(9) = 4.10599E-01     B0(10) = 2.98599E-01
B1(4) =-2.27099E-03     B1(5) =-1.53999E-03
B1(9) =-4.85999E-04     B1(10) =-3.21599E-03
B2(4) = 1.48999E-04     B2(5) =-2.94999E-06
B2(9) =-1.44499E-05     B2(10) = 6.36599E-05
G0(4) = 1.69599E-02     G0(5) = 1.68099E-02
G0(9) = 1.66499E-02     G0(10) = 1.70099E-02
G1(4) = 1.30999E-05     G1(5) - 9.64799E-06
G1(9) = 4.61899E-06     G1(10) = 1.28899E-05
G2(4) =-2.51299E-07     G2(5) = 2.53399E-07
G2(9) = 3.23799E-07     G2(10) = 7.73999E-08;
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