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Estimated Radiation Levels in SSC Detectors*

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Results of a Monte Carlo simulation of energy deposition from pp collisions in the active regions of a generic SSC detector are reported. The detector geometry is shown in Fig. 1. It is cylindrically symmetric about the z-axis and reflection symmetric in the x,y-plane. Because interest is limited to the active regions (excluding principally the iron), a radial cutoff is applied as indicated in fig. 1. A uniform magnetic field in the z-direction of 2 Tesla is present in the $-7.6 < z < 7.6$ m region. Elsewhere the field vanishes. While this is no doubt a rather idealized picture of such a detector it is nonetheless a meaningful one, at least to the extent that its main features bearing on energy deposition are retained. To specify considerably beyond such a picture best awaits a firmer design (which itself may depend on results of the type presented here).

For simplicity the calorimeter medium (uranium/scintillator, with assumed fractional atomic composition of 0.35 H, 0.32 C, and 0.33 U) is represented as homogeneous and monatomic with $Z = 81.9$, $A = 185.6$, and $\rho = 10.0$ g/cm^3. This choice of parameters results in a medium with the same absorption length (λ_{abs}) and radiation length (X_0) as the calorimeter if its constituents were mixed at the atomic level. A similar homogenization is applied to represent the tracking chambers (with composition 0.35 H, 0.44 C, 0.17 O, and 0.04 Fe). The relevant material properties assumed for these and other parts of the detector are summarized in Table I.

The z-coordinate of the interaction point is selected from a Gaussian distribution with $\langle z \rangle = 0$ and $\sigma_z = 10$ cm. Because of the small transverse beam size at the interaction point, $r = 0$ is assumed. The crossing angle of the colliding beams is neglected. Particle production at the 20 TeV on 20 TeV pp vertex is simulated by ISAJET[1,2] Particle production and transport within beampipe and detector is simulated by CASIM[3] It should be pointed out that CASIM treats low energy neutrons (and low energy phenomena in general) very crudely and that simple energy deposition is a poor measure for most types of radiation damage inflicted by these neutrons[4] This contribution will also be the one most affected by the radial cutoff.

In the active regions the detector is divided into a set of volume bins to record the energy deposition. Because of expected variations in energy density with location and because of the geometry of the detector, division into a simple, uniform grid is not indicated.

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Instead, the active regions are first divided into subregions which are then further divided into regular ring-shaped volumes, with fixed Δz and Δr within each subregion. Bin location and dimensions are shown in Fig. 2 for the central calorimeter and in Fig. 3 for the end calorimeter(s). A few bins of the central calorimeter (the ones located closest to the beam for $4 < |z| < 7$ m) actually have a conical inner surface while the outer surface remains cylindrical. The program also computes energy density as a function of z in the beampipe (Fig. 4) as well as the electromagnetic, hadronic, and total energy deposited in each of the subregions of the detector (Table II).

The more detailed outputs of the calculation, for 500 ISAJET events, are presented in Tables III-IX. These list energy density in GeV/(cm^3•event) in each of the above described bins. The subregions may be identified from Figs. 2 and 3. For ease of reference, an attempt is made to introduce some resemblance between bin location in the table and in the figures, though it is not exact.

Not surprisingly the hottest region is at small radii near the front ($z \simeq 15$ m) of the end calorimeter, with the highest readings approaching 0.1 GeV/(cm^3•event). Rings of dimensions (1 cm X 1 cm X r) are used there with obvious statistical consequences. Note that the EC0 region and EC1 region are not mutually exclusive: events in EC0 are also recorded in EC1. From the energy accounting balance performed by the program more than 90% of the energy escapes the detector. This may be a slight overestimate due to the radial cutoff present in the calculation. It also appears that the beampipe plays a significant role: a particle striking the pipe at (e.g.) 20 m has a 1 mrad angle and has 1 m of beryllium (~2.5 λ_{abs} or ~2.8 X_0) ahead of it. For charged particles the **B** field makes this even worse.

Care must be taken in the interpretation of the energy deposition in the mixed media representing tracking chambers and calorimeters. The values reported represent an average (in the manner described above) over the various components of such a medium. To find the energy density in a specific component this averaging must be undone, e.g., to first approximation, by multiplying by the ratio of the density of the component to that of the average. A better choice of scaling parameter is dE/dx for a minimum ionizing particle (energy loss per unit *distance*). For convenience the dE/dx values are included in Table I along with similar data on the uranium and scintillator components of the calorimeters. As an example, to convert a given table entry in the calorimeter to dose (D_s, in gray/event) in the *scintillator* part of the calorimeter in that vicinty:

$$D_s = \rho_E^{cal} \bullet (1.84/8.99) \bullet (1.6 \bullet 10^{-7}/1.03)$$

where ρ_E^{cal} is the table entry (in GeV/cm^3•event) representing energy density in the calorimeter aggregate. The second factor is the ratio of dE/dx in scintillator to dE/dx in the (averaged) calorimeter and the third factor converts GeV/cm^3 to gray (joule/kg) which involves the scintillator density (1.03 g/cm^3). At some level of approximation such procedures can be extended to materials not explicitly included in the calculation, provided their presence does not significantly affect the cascade development. In a more mature analysis it might be worth the price, in program complexity and computer time, to encode the different materials into the geometry.

Also listed in the tables is a *relative error* for each bin which is the standard deviation of the average obtained from dividing the Monte Carlo run into ten sub-runs. This must be interpreted with some caution since the underlying distribution is seldom Gaussian. From experience it seems that only when this error is < ~25% does it approach its usual (Gaussian) meaning in terms of frequencies, etc. For large errors the distribution tends to peak at or near zero and exhibit a long tail which dominates the average. As an example: when all contributions to some bin are made during a single sub-run the relative error is maximum and equal to unity, which completely covers the downside, but one *cannot* conclude that a few times this calculated average is a reasonable upper bound for the true average.

Because their contents are frequently derived from the same set of particle trajectories, there are inevitably strong correlations among nearby bins. Since these correlations are not explicitly calculated the conservative approach is to assume, should the need arise, e.g., to combine some bins, that the coefficient of correlation for bins in close proximity is unity.

My thanks to Gil Gilchriese for providing the details of the detector and for discussion and to Ed Wang for the ISAJET events.

REFERENCES

[1] F. E. Paige and S. D. Protopopescu, BNL preprint-38034 (1986).

[2] For the particular version employed here see the contribution of E. M. Wang in Task Force Report, Radiation in the SSC Interaction Regions, D. E. Groom, Ed., SSC-SR-1033 (1988).

[3] A. Van Ginneken, FNAL FN-272 (1975).

[4] see, e.g., some contributions on this subject in SSC-SR-1033, ref.[2].

TABLE I

MATERIAL PROPERTIES

	Be	Fe	track chambs	calori meter	U	scint $(CH)_n$
Z	4	26	10.9	81.9	92	
A	9.0	55.9	16.5	185.6	238.0	
ρ, g.cm^{-3}	1.85	7.87	.0224	10.0	18.95	1.03
λ_{abs}, cm	40.6	16.6	4090.	18.6	199.	82.0
X_o, cm	35.3	1.76	18.6	0.641	0.32	42.4
dE/dx^*, MeV.cm^{-1}	2.72	10.47	.0431	8.99	18.24	1.84

*for minimum ionizing electron

TABLE II

ENERGY DEPOSITED (GeV/event) IN VARIOUS DETECTOR REGIONS

E. M. ENERGY

CENTRAL CALORIMETER		END CALORIMETERS	
1	5.70E+00 (.02)	1	3.58E+02 (.01)
2	1.90E-02 (.37)	2	1.53E+02 (.03)
3	2.13E+01 (.06)	3	1.65E+02 (.03)
4	1.79E+00 (.20)	4	1.86E+00 (.13)
5	8.74E-03 (.48)	5	1.04E+00 (.22)
6	2.48E-06 (1.00)	6	2.09E+02 (.02)
7	4.45E-02 (.09)	7	4.31E-03 (1.00)
8	5.63E+00 (.04)	8	9.73E-01 (.24)

HADRONIC ENERGY

CENTRAL CALORIMETER		END CALORIMETERS	
1	4.70E+00 (.03)	1	1.37E+02 (.02)
2	1.15E+00 (.03)	2	1.30E+02 (.03)
3	1.99E+01 (.04)	3	1.28E+02 (.03)
4	4.91E+00 (.09)	4	2.60E+01 (.04)
5	5.46E-01 (.04)	5	1.77E+01 (.05)
6	2.42E-02 (.20)	6	1.07E+02 (.02)
7	5.14E-01 (.02)	7	8.05E+00 (.05)
8	2.71E+00 (.03)	8	3.21E+00 (.12)

TOTAL ENERGY

CENTRAL CALORIMETER		END CALORIMETERS	
1	1.04E+01 (.02)	1	4.95E+02 (.01)
2	1.17E+00 (.03)	2	2.83E+02 (.03)
3	4.12E+01 (.05)	3	2.93E+02 (.03)
4	6.69E+00 (.09)	4	2.78E+01 (.04)
5	5.55E-01 (.04)	5	1.88E+01 (.05)
6	2.43E-02 (.20)	6	3.17E+02 (.01)
7	5.58E-01 (.02)	7	8.06E+00 (.05)
8	8.34E+00 (.03)	8	4.18E+00 (.14)

Central Calorimeter region 7 denotes Tracking Chambers
Central Calorimeter region 8 denotes Beampipe

TABLE III a

ENERGY DENSITY (GeV/cm^3*event) AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		.0 50.0	50.0 100.0	100.0 150.0	150.0 200.0	200.0 250.0	250.0 300.0	300.0 350.0	350.0 400.0
CENTRAL CALORIMETER REGION 2									
195.0	200.0	7.10E-08	7.24E-08	6.13E-08	7.12E-08	5.84E-08	6.31E-08	5.91E-08	5.12E-08
190.0	195.0	1.15E-07	9.84E-08	8.54E-08	1.05E-07	8.40E-08	1.00E-07	8.99E-08	9.91E-08
185.0	190.0	1.34E-07	1.20E-07	1.34E-07	1.42E-07	1.40E-07	1.39E-07	1.28E-07	1.59E-07
180.0	185.0	2.18E-07	1.77E-07	1.72E-07	2.02E-07	2.07E-07	2.02E-07	1.98E-07	2.13E-07
CENTRAL CALORIMETER REGION 1									
179.0	180.0	2.82E-07	3.00E-07	2.31E-07	1.76E-07	2.60E-07	2.33E-07	2.97E-07	3.36E-07
178.0	179.0	2.18E-07	2.43E-07	2.76E-07	2.33E-07	2.81E-07	2.96E-07	3.78E-07	2.96E-07
177.0	178.0	1.74E-07	2.47E-07	3.34E-07	2.20E-07	2.59E-07	3.27E-07	2.63E-07	2.74E-07
176.0	177.0	2.56E-07	1.96E-07	3.59E-07	3.03E-07	2.86E-07	4.03E-07	4.14E-07	3.32E-07
175.0	176.0	2.32E-07	2.65E-07	2.47E-07	3.74E-07	2.81E-07	2.94E-07	3.80E-07	2.81E-07
174.0	175.0	3.04E-07	2.52E-07	2.95E-07	3.36E-07	3.80E-07	4.25E-07	4.79E-07	3.43E-07
173.0	174.0	3.24E-07	2.88E-07	3.01E-07	3.34E-07	4.66E-07	3.03E-07	4.12E-07	4.83E-07
172.0	173.0	4.38E-07	3.89E-07	3.00E-07	3.03E-07	5.40E-07	4.59E-07	5.53E-07	3.54E-07
171.0	172.0	5.02E-07	5.63E-07	3.88E-07	3.04E-07	4.37E-07	5.40E-07	7.35E-07	3.70E-07
170.0	171.0	6.87E-07	5.78E-07	4.99E-07	4.51E-07	3.85E-07	5.39E-07	6.87E-07	5.46E-07
169.0	170.0	6.82E-07	7.73E-07	8.21E-07	6.67E-07	5.97E-07	5.55E-07	7.24E-07	7.09E-07
168.0	169.0	6.40E-07	7.38E-07	8.46E-07	7.76E-07	7.22E-07	6.18E-07	9.30E-07	9.37E-07
167.0	168.0	7.13E-07	7.55E-07	8.57E-07	1.16E-06	1.00E-06	7.63E-07	8.45E-07	8.88E-07
166.0	167.0	1.18E-06	8.75E-07	8.37E-07	9.27E-07	1.19E-06	1.17E-06	1.02E-06	8.11E-07
165.0	166.0	1.25E-06	1.14E-06	1.06E-06	1.08E-06	1.09E-06	1.56E-06	1.34E-06	1.22E-06
164.0	165.0	1.88E-06	1.72E-06	1.58E-06	1.04E-06	1.53E-06	1.06E-06	1.98E-06	1.60E-06
163.0	164.0	2.74E-06	2.53E-06	2.23E-06	2.26E-06	2.15E-06	1.55E-06	2.13E-06	1.83E-06
162.0	163.0	3.38E-06	3.85E-06	3.71E-06	3.76E-06	3.64E-06	3.26E-06	3.48E-06	3.28E-06
161.0	162.0	3.52E-06	4.05E-06	4.06E-06	5.01E-06	5.82E-06	6.09E-06	6.77E-06	6.34E-06
160.0	161.0	2.20E-06	2.53E-06	2.78E-06	3.83E-06	4.11E-06	5.63E-06	7.79E-06	7.22E-06
TRACKING CHAMBERS									
155.0	160.0	5.56E-09	8.46E-09	6.93E-09	6.82E-09	7.56E-09	1.11E-08	1.29E-08	9.85E-09
150.0	155.0	5.90E-09	7.15E-09	7.54E-09	8.22E-09	9.51E-09	1.24E-08	1.96E-08	1.14E-08
145.0	150.0	1.35E-08	8.67E-09	7.78E-09	9.33E-09	9.72E-09	9.85E-09	8.87E-09	1.73E-08
140.0	145.0	1.16E-08	1.36E-08	1.10E-08	1.27E-08	1.45E-08	1.51E-08	1.62E-08	1.11E-08
135.0	140.0	1.13E-08	1.11E-08	1.04E-08	1.33E-08	1.95E-08	2.19E-08	1.65E-08	2.40E-08
130.0	135.0	1.28E-08	1.12E-08	1.30E-08	1.10E-08	1.71E-08	1.45E-08	1.81E-08	1.70E-08
125.0	130.0	1.56E-08	1.29E-08	1.29E-08	1.53E-08	1.62E-08	2.08E-08	1.79E-08	1.35E-08
120.0	125.0	1.35E-08	1.27E-08	1.77E-08	1.55E-08	1.93E-08	1.82E-08	2.68E-08	2.50E-08
115.0	120.0	1.60E-08	1.91E-08	2.54E-08	1.77E-08	1.78E-08	2.06E-08	2.45E-08	2.42E-08
110.0	115.0	1.78E-08	1.59E-08	2.04E-08	1.54E-08	1.93E-08	2.03E-08	2.21E-08	1.96E-08
105.0	110.0	1.78E-08	1.84E-08	1.81E-08	2.00E-08	2.62E-08	2.80E-08	2.58E-08	2.51E-08
100.0	105.0	1.54E-08	2.10E-08	1.86E-08	1.82E-08	1.91E-08	2.13E-08	2.60E-08	2.08E-08
95.0	100.0	2.11E-08	2.13E-08	2.12E-08	2.01E-08	3.01E-08	3.98E-08	2.73E-08	2.84E-08
90.0	95.0	2.00E-08	2.49E-08	2.17E-08	2.78E-08	3.10E-08	4.04E-08	2.48E-08	2.88E-08
85.0	90.0	2.56E-08	2.14E-08	2.98E-08	2.60E-08	2.59E-08	4.66E-08	3.29E-08	3.21E-08
80.0	85.0	2.70E-08	2.91E-08	3.01E-08	2.84E-08	2.63E-08	2.81E-08	3.39E-08	6.85E-08
75.0	80.0	2.21E-08	2.64E-08	2.75E-08	3.20E-08	3.62E-08	7.09E-08	4.49E-08	2.66E-08
70.0	75.0	2.89E-08	2.92E-08	3.88E-08	3.48E-08	3.27E-08	3.44E-08	3.78E-08	3.76E-08
65.0	70.0	2.95E-08	3.86E-08	4.67E-08	4.63E-08	3.14E-08	3.97E-08	3.75E-08	4.25E-08
60.0	65.0	3.06E-08	3.14E-08	3.47E-08	3.39E-08	4.04E-08	3.64E-08	4.68E-08	4.06E-08

TABLE III b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		.0 50.0	50.0 100.0	100.0 150.0	150.0 200.0	200.0 250.0	250.0 300.0	300.0 350.0	350.0 400.0
CENTRAL CALORIMETER REGION 2									
195.0	200.0	.13	.07	.10	.09	.07	.08	.11	.16
190.0	195.0	.08	.08	.08	.10	.06	.09	.09	.18
185.0	190.0	.12	.04	.08	.12	.06	.10	.12	.18
180.0	185.0	.10	.04	.06	.09	.09	.09	.10	.07
CENTRAL CALORIMETER REGION 1									
179.0	180.0	.05	.03	.08	.11	.09	.13	.19	.31
178.0	179.0	.13	.06	.07	.16	.10	.11	.20	.13
177.0	178.0	.09	.08	.09	.06	.05	.10	.09	.10
176.0	177.0	.22	.05	.08	.07	.11	.15	.13	.18
175.0	176.0	.07	.13	.09	.07	.05	.11	.17	.09
174.0	175.0	.08	.06	.11	.04	.13	.15	.18	.12
173.0	174.0	.09	.10	.12	.09	.10	.08	.06	.22
172.0	173.0	.08	.06	.07	.09	.14	.17	.17	.07
171.0	172.0	.08	.09	.10	.12	.09	.11	.16	.10
170.0	171.0	.03	.03	.06	.12	.12	.06	.10	.14
169.0	170.0	.06	.05	.10	.11	.17	.08	.05	.10
168.0	169.0	.09	.10	.05	.05	.10	.12	.11	.12
167.0	168.0	.09	.10	.07	.10	.08	.14	.12	.21
166.0	167.0	.11	.09	.11	.09	.08	.13	.14	.13
165.0	166.0	.13	.08	.09	.09	.07	.10	.09	.14
164.0	165.0	.11	.11	.06	.07	.11	.09	.18	.08
163.0	164.0	.08	.05	.09	.12	.06	.11	.15	.15
162.0	163.0	.03	.06	.07	.08	.09	.07	.11	.17
161.0	162.0	.07	.03	.04	.10	.05	.04	.10	.10
160.0	161.0	.05	.05	.03	.09	.07	.07	.21	.10
TRACKING CHAMBERS									
155.0	160.0	.10	.16	.16	.14	.19	.16	.27	.16
150.0	155.0	.09	.09	.18	.13	.12	.19	.29	.21
145.0	150.0	.23	.12	.16	.13	.09	.10	.10	.38
140.0	145.0	.11	.20	.13	.16	.13	.25	.18	.15
135.0	140.0	.16	.20	.12	.17	.21	.20	.14	.27
130.0	135.0	.14	.09	.07	.08	.07	.13	.09	.15
125.0	130.0	.17	.14	.08	.11	.11	.12	.19	.18
120.0	125.0	.15	.04	.16	.13	.13	.08	.25	.16
115.0	120.0	.08	.20	.35	.10	.08	.11	.08	.26
110.0	115.0	.13	.07	.21	.08	.09	.16	.07	.14
105.0	110.0	.07	.12	.14	.12	.22	.08	.12	.22
100.0	105.0	.08	.20	.11	.12	.10	.11	.06	.16
95.0	100.0	.11	.10	.12	.12	.16	.31	.10	.19
90.0	95.0	.08	.13	.11	.15	.19	.17	.12	.11
85.0	90.0	.08	.12	.09	.09	.10	.21	.07	.10
80.0	85.0	.07	.10	.10	.10	.12	.12	.08	.42
75.0	80.0	.11	.08	.07	.08	.15	.38	.17	.06
70.0	75.0	.08	.07	.09	.04	.07	.06	.12	.19
65.0	70.0	.06	.11	.17	.26	.08	.10	.10	.20
60.0	65.0	.05	.07	.08	.08	.11	.09	.20	.11

TABLE IV a

ENERGY DENSITY (GeV/cm^3*event) AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		400.0	410.0	420.0	430.0	440.0	450.0	460.0	470.0	480.0	490.0
		410.0	420.0	430.0	440.0	450.0	460.0	470.0	480.0	490.0	500.0
CENTRAL CALORIMETER REGION 3											
195.0	200.0	4.85E-08	4.91E-08	8.62E-08	3.87E-08	5.60E-08	8.97E-08	4.10E-08	4.30E-08	3.36E-08	2.83E-08
190.0	195.0	9.22E-08	6.18E-08	8.51E-08	1.07E-07	5.58E-08	1.25E-07	6.83E-08	4.70E-08	2.84E-08	2.63E-08
185.0	190.0	9.53E-08	1.34E-07	1.63E-07	1.26E-07	2.04E-07	9.97E-08	6.85E-08	7.01E-08	5.64E-08	4.70E-08
180.0	185.0	1.64E-07	1.90E-07	2.19E-07	1.59E-07	2.07E-07	1.64E-07	1.34E-07	1.08E-07	6.14E-08	5.76E-08
175.0	180.0	3.57E-07	3.07E-07	2.75E-07	2.64E-07	3.30E-07	2.44E-07	1.49E-07	8.83E-08	5.80E-08	6.26E-08
170.0	175.0	5.53E-07	4.56E-07	4.22E-07	4.43E-07	2.36E-07	1.79E-07	1.56E-07	9.02E-08	7.56E-08	7.98E-08
165.0	170.0	1.10E-06	7.44E-07	5.86E-07	4.57E-07	4.06E-07	2.76E-07	1.65E-07	9.40E-08	8.43E-08	9.97E-08
160.0	165.0	3.18E-06	8.16E-07	6.86E-07	5.00E-07	3.68E-07	3.68E-07	3.21E-07	1.64E-07	4.66E-07	1.54E-07
155.0	160.0	4.76E-06	8.18E-07	6.77E-07	6.38E-07	3.40E-07	2.77E-07	2.71E-07	1.46E-07	2.05E-07	9.17E-08
150.0	155.0	5.36E-06	8.84E-07	7.79E-07	5.99E-07	4.71E-07	3.43E-07	3.80E-07	2.10E-07	1.68E-07	8.17E-08
145.0	150.0	4.99E-06	9.62E-07	1.12E-06	9.83E-07	5.00E-07	3.41E-07	3.56E-07	1.99E-07	1.13E-07	9.74E-08
140.0	145.0	6.89E-06	1.08E-06	1.04E-06	8.29E-07	6.59E-07	3.86E-07	4.12E-07	3.40E-07	1.26E-07	9.21E-08
135.0	140.0	6.82E-06	1.38E-06	1.04E-06	9.56E-07	6.70E-07	4.98E-07	3.74E-07	2.32E-07	1.68E-07	1.22E-07
130.0	135.0	7.57E-06	1.84E-06	1.27E-06	8.61E-07	7.63E-07	7.89E-07	4.88E-07	2.57E-07	2.38E-07	1.79E-07
125.0	130.0	9.52E-06	1.59E-06	1.60E-06	1.22E-06	9.04E-07	9.86E-07	6.72E-07	3.98E-07	3.20E-07	2.85E-07
120.0	125.0	1.07E-05	2.70E-06	1.74E-06	1.11E-06	1.38E-06	8.97E-07	6.23E-07	4.21E-07	4.07E-07	3.46E 07
115.0	120.0	1.21E-05	2.16E-06	1.71E-06	1.48E-06	1.15E-06	9.54E-07	8.23E-07	4.55E-07	3.92E-07	4.26E 07
110.0	115.0	1.27E-05	2.88E-06	2.41E-06	1.81E-06	1.54E-06	1.60E-06	7.10E-07	6.41E-07	5.28E-07	4.22E-07
105.0	110.0	1.51E-05	2.87E-06	2.39E-06	1.93E-06	1.65E-06	1.49E-06	1.27E-06	7.40E-07	6.69E-07	4.75E-07
100.0	105.0	1.48E-05	4.09E-06	2.84E-06	2.53E-06	2.15E-06	1.57E-06	1.11E-06	9.18E-07	9.80E-07	4.71E-07
95.0	100.0	1.69E-05	4.15E-06	4.45E-06	3.60E-06	2.35E-06	1.63E-06	1.79E-06	1.07E-06	8.05E-07	5.20E-07
90.0	95.0	2.35E-05	5.11E-06	3.97E-06	3.78E-06	2.63E-06	2.35E-06	1.89E-06	1.34E-06	1.08E-06	7.35E-07
85.0	90.0	2.87E-05	5.89E-06	4.82E-06	3.96E-06	3.26E-06	2.51E-06	1.90E-06	1.93E-06	1.39E-06	8.93E-07
80.0	85.0	2.91E-05	6.20E-06	5.01E-06	3.66E-06	3.84E-06	3.03E-06	2.66E-06	2.34E-06	1.68E-06	1.38E-06
75.0	80.0	3.57E-05	7.14E-06	6.34E-06	5.34E-06	4.97E-06	4.10E-06	3.29E-06	3.12E-06	2.40E-06	1.99E-06
70.0	75.0	4.68E-05	8.67E-06	7.27E-06	6.41E-06	6.45E-06	6.68E-06	6.40E-06	3.72E-06	2.69E-06	2.01E-06
65.0	70.0	5.57E-05	1.40E-05	1.02E-05	9.15E-06	1.02E-05	6.60E-06	5.61E-06	4.07E-06	3.39E-06	2.29E-06
60.0	65.0	6.64E-05	1.54E-05	1.27E-05	1.21E-05	1.03E-05	9.52E-06	6.71E-06	4.65E-06	4.39E-06	3.55E-06
55.0	60.0	9.79E-05	2.50E-05	2.23E-05	1.56E-05	1.50E-05	8.70E-06	7.44E-06	6.84E-06	4.81E-06	3.92E-06
50.0	55.0	1.21E-04	3.29E-05	2.26E-05	1.85E-05	1.65E-05	1.01E-05	9.06E-06	7.48E-06	5.71E-06	6.13E-06
45.0	50.0	1.64E-04	3.99E-05	2.92E-05	2.35E-05	2.04E-05	1.44E-05	1.70E-05	8.06E-05	1.63E-05	4.34E-06
40.0	45.0	2.26E-04	4.41E-05	2.22E-05	1.40E-05	5.45E-06	.00E+00	.00E+00	.00E+00	.00E+00	.00E+00

TABLE IV b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

CENTRAL CALORIMETER REGION 3

		400.0 410.0	410.0 420.0	420.0 430.0	430.0 440.0	440.0 450.0	450.0 460.0	460.0 470.0	470.0 480.0	480.0 490.0	490.0 500.0
195.0	200.0	.13	.16	.46	.26	.34	.57	.28	.28	.23	.42
190.0	195.0	.14	.12	.31	.56	.14	.38	.15	.24	.19	.24
185.0	190.0	.22	.28	.36	.29	.42	.18	.12	.20	.16	.28
180.0	185.0	.12	.17	.23	.16	.20	.13	.11	.14	.18	.27
175.0	180.0	.17	.15	.14	.13	.21	.29	.19	.19	.33	.28
170.0	175.0	.17	.11	.10	.20	.10	.15	.19	.33	.27	.36
165.0	170.0	.09	.12	.10	.10	.20	.16	.24	.17	.31	.17
160.0	165.0	.12	.18	.16	.17	.13	.28	.58	.24	.72	.52
155.0	160.0	.13	.12	.13	.15	.15	.18	.25	.22	.53	.29
150.0	155.0	.15	.08	.15	.14	.14	.18	.32	.18	.22	.18
145.0	150.0	.13	.08	.22	.16	.12	.15	.26	.16	.19	.25
140.0	145.0	.06	.10	.12	.21	.17	.13	.34	.42	.19	.14
135.0	140.0	.15	.14	.12	.11	.14	.16	.15	.11	.07	.16
130.0	135.0	.08	.10	.14	.09	.15	.18	.07	.13	.11	.23
125.0	130.0	.10	.12	.16	.09	.10	.18	.14	.11	.29	.33
120.0	125.0	.14	.25	.07	.12	.19	.21	.15	.16	.17	.30
115.0	120.0	.11	.16	.11	.11	.08	.16	.21	.15	.13	.25
110.0	115.0	.07	.09	.12	.08	.10	.23	.11	.12	.17	.21
105.0	110.0	.07	.07	.12	.08	.11	.27	.29	.12	.11	.22
100.0	105.0	.08	.18	.07	.11	.15	.13	.10	.11	.14	.08
95.0	100.0	.07	.18	.13	.19	.11	.07	.16	.15	.12	.16
90.0	95.0	.08	.09	.11	.07	.05	.10	.16	.13	.18	.15
85.0	90.0	.10	.16	.09	.15	.17	.09	.05	.13	.12	.07
80.0	85.0	.12	.14	.10	.05	.09	.08	.17	.17	.12	.17
75.0	80.0	.10	.11	.14	.08	.10	.09	.12	.20	.15	.16
70.0	75.0	.08	.04	.07	.07	.16	.13	.27	.13	.10	.14
65.0	70.0	.09	.15	.06	.08	.10	.06	.12	.05	.18	.12
60.0	65.0	.10	.06	.08	.08	.06	.11	.08	.06	.14	.25
55.0	60.0	.07	.06	.16	.06	.14	.09	.06	.21	.09	.16
50.0	55.0	.06	.08	.09	.08	.13	.12	.09	.10	.13	.11
45.0	50.0	.09	.18	.09	.12	.18	.12	.26	.91	.27	.32
40.0	45.0	.09	.07	.12	.14	.14	.00	.00	.00	.00	.00

TABLE V a

ENERGY DENSITY (GeV/cm^3*event) AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		.0 100.0	100.0 200.0	200.0 300.0	300.0 400.0	400.0 500.0	500.0 600.0	600. 700.
CENTRAL CALORIMETER REGION 6								
380.0	400.0	9.82E-13	2.07E-13	8.62E-14	2.80E-14	3.31E-14	4.97E-15	3.17E-1
360.0	380.0	9.49E-12	7.39E-13	1.72E-13	1.10E-13	1.89E-13	1.22E-13	4.71E-1
340.0	360.0	1.07E-10	2.84E-12	7.50E-13	3.21E-13	2.87E-12	7.48E-13	9.01E-1
320.0	340.0	1.35E-10	1.54E-11	2.70E-12	1.38E-12	1.60E-11	8.48E-13	7.06E-1
300.0	320.0	2.37E-10	9.33E-11	3.26E-11	4.28E-12	2.29E-10	2.49E-12	1.47E-1
280.0	300.0	5.20E-10	3.22E-10	5.13E-11	2.58E-11	2.39E-10	3.01E-11	1.10E-1
260.0	280.0	1.72E-09	1.33E-09	3.84E-10	1.56E-10	1.93E-10	2.09E-10	2.20E-1
CENTRAL CALORIMETER REGION 5								
240.0	250.0	3.44E-09	3.05E-09	1.28E-09	7.28E-10	1.82E-10	4.50E-10	3.29E-1
230.0	240.0	6.78E-09	5.04E-09	1.71E-09	2.03E-09	8.21E-10	8.77E-10	5.93E-1
220.0	230.0	1.08E-08	8.14E-09	7.02E-09	4.64E-09	4.49E-09	1.74E-09	2.21E-1
210.0	220.0	1.62E-08	1.14E-08	1.11E-08	8.79E-09	4.82E-09	2.39E-09	6.37E-1
200.0	210.0	2.84E-08	2.12E-08	2.04E-08	1.34E-08	1.09E-08	2.78E-09	8.18E-1
190.0	200.0	4.72E-08	4.43E-08	3.84E-08	2.91E-08	2.78E-08	3.32E-09	1.86E-0

CENTRAL CALORIMETER REGION 4

		500.0 550.0	550.0 600.0	600.0 650.0	650. 700.
195.0	200.0	1.01E-08	1.66E-09	2.23E-09	1.74E-0
190.0	195.0	1.23E-08	6.02E-09	3.97E-09	1.29E-0
185.0	190.0	1.93E-08	8.04E-09	7.91E-10	2.29E-0
180.0	185.0	1.82E-08	5.25E-09	4.78E-10	1.69E-0
175.0	180.0	3.98E-08	5.11E-09	1.71E-10	2.33E-0
170.0	175.0	3.68E-08	3.04E-09	3.66E-10	2.84E-0
165.0	170.0	2.74E-08	1.34E-08	4.06E-10	4.02E-0
160.0	165.0	3.77E-08	7.80E-09	3.47E-10	5.60E-0
155.0	160.0	3.64E-08	4.72E-09	1.55E-09	4.00E-0
150.0	155.0	4.63E-08	6.01E-09	1.35E-09	4.82E-0
145.0	150.0	4.13E-08	8.71E-09	1.46E-09	5.42E-0
140.0	145.0	6.06E-08	1.02E-08	1.48E-09	1.79E-0
135.0	140.0	5.62E-08	1.29E-08	1.94E-09	9.90E-0
130.0	135.0	4.97E-08	1.27E-08	1.69E-09	2.15E-0
125.0	130.0	6.87E-08	2.98E-08	4.70E-09	3.55E-0
120.0	125.0	1.08E-07	2.46E-08	5.51E-09	1.24E-0
115.0	120.0	1.26E-07	3.41E-08	4.66E-09	1.23E-0
110.0	115.0	1.90E-07	5.86E-08	4.35E-09	9.57E-0
105.0	110.0	2.24E-07	8.67E-08	8.99E-09	1.09E-07
100.0	105.0	2.30E-07	8.57E-08	1.97E-08	3.18E-0
95.0	100.0	3.19E-07	1.36E-07	3.30E-08	6.02E-0
90.0	95.0	4.60E-07	1.87E-07	7.75E-08	1.04E-07
85.0	90.0	5.70E-07	1.57E-07	8.75E-08	2.23E-07
80.0	85.0	1.10E-06	2.83E-07	1.48E-07	8.11E-07
75.0	80.0	9.82E-07	4.29E-07	2.68E-07	9.49E-07
70.0	75.0	1.47E-06	1.13E-06	1.25E-06	1.40E-06
65.0	70.0	1.92E-06	1.83E-06	2.31E-06	1.82E-0
60.0	65.0	2.74E-06	6.06E-06	1.04E-05	.00E+0
55.0	60.0	5.25E-06	1.18E-05	.00E+00	.00E+0
50.0	55.0	1.94E-05	.00E+00	.00E+00	.00E+00

TABLE V b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN

		.0 100.0	100.0 200.0	200.0 300.0	300.0 400.0	400.0 500.0	500.0 600.0	600. 700.
CENTRAL CALORIMETER REGION 6								
380.0	400.0	.63	.55	.55	.43	.87	.24	.4
360.0	380.0	.85	.53	.55	.43	.58	.81	.3
340.0	360.0	.82	.49	.58	.39	.90	.89	.4
320.0	340.0	.68	.38	.49	.39	.93	.69	.2
300.0	320.0	.73	.47	.61	.30	.97	.57	.4
280.0	300.0	.54	.31	.25	.24	.92	.60	.2
260.0	280.0	.31	.25	.35	.31	.49	.67	.2
CENTRAL CALORIMETER REGION 5								
240.0	250.0	.12	.19	.25	.21	.15	.63	.3
230.0	240.0	.18	.17	.32	.28	.31	.54	.3
220.0	230.0	.16	.17	.54	.34	.70	.47	.2
210.0	220.0	.13	.11	.16	.19	.22	.33	.2
200.0	210.0	.10	.12	.15	.11	.15	.27	.2
190.0	200.0	.10	.10	.07	.08	.18	.21	.4

CENTRAL CALORIMETER REGION 4

		500.0 550.0	550.0 600.0	600.0 650.0	650.0 700.0
195.0	200.0	.27	.42	.95	.14
190.0	195.0	.22	.61	.94	.23
185.0	190.0	.31	.58	.58	.28
180.0	185.0	.38	.51	.55	.29
175.0	180.0	.51	.56	.41	.34
170.0	175.0	.31	.34	.64	.26
165.0	170.0	.18	.76	.44	.32
160.0	165.0	.23	.47	.33	.29
155.0	160.0	.22	.27	.80	.36
150.0	155.0	.19	.30	.59	.27
145.0	150.0	.15	.34	.47	.22
140.0	145.0	.27	.38	.31	.40
135.0	140.0	.20	.39	.31	.18
130.0	135.0	.13	.23	.30	.48
125.0	130.0	.13	.21	.36	.85
120.0	125.0	.15	.23	.53	.15
115.0	120.0	.19	.20	.28	.13
110.0	115.0	.25	.17	.22	.53
105.0	110.0	.13	.26	.37	.87
100.0	105.0	.16	.29	.51	.18
95.0	100.0	.15	.28	.33	.22
90.0	95.0	.12	.41	.37	.25
85.0	90.0	.12	.17	.33	.29
80.0	85.0	.27	.25	.17	.31
75.0	80.0	.10	.11	.18	.17
70.0	75.0	.18	.15	.40	.27
65.0	70.0	.20	.20	.13	.38
60.0	65.0	.14	.26	.18	.00
55.0	60.0	.14	.23	.00	.00
50.0	55.0	.23	.00	.00	.00

TABLE VI a

ENERGY DENSITY (GeV/cm^3•event) AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

END CALORIMETER REGION 0

		1500.0 1501.0	1501.0 1502.0	1502.0 1503.0	1503.0 1504.0	1504.0 1505.0	1505.0 1506.0	1506.0 1507.0	1507.0 1508.0	1508.0 1509.0	1509.0 1510.0
19.0	20.0	4.10E-04	2.93E-03	7.87E-03	1.34E-02	1.36E-02	1.49E-02	5.80E-03	5.98E-03	6.98E-03	2.13E-03
18.0	19.0	6.34E-04	2.32E-03	8.91E-03	1.03E-02	1.33E-02	1.56E-02	1.92E-02	8.80E-03	7.74E-03	6.29E-03
17.0	18.0	8.51E-04	4.36E-03	1.05E-02	1.50E-02	1.99E-02	1.80E-02	1.48E-02	1.26E-02	8.36E-03	6.30E-03
16.0	17.0	1.07E-03	4.28E-03	1.99E-02	1.80E-02	2.07E-02	1.52E-02	1.33E-02	7.11E-03	6.98E-03	6.57E-03
15.0	16.0	1.17E-03	6.72E-03	1.88E-02	2.50E-02	2.79E-02	2.31E-02	2.17E-02	1.18E-02	1.20E-02	9.00E-03
14.0	15.0	1.13E-03	9.02E-03	2.01E-02	2.55E-02	3.08E-02	2.54E-02	1.60E-02	1.53E-02	9.38E-03	9.59E-03
13.0	14.0	1.22E-03	9.35E-03	1.89E-02	3.87E-02	3.40E-02	2.82E-02	3.37E-02	1.74E-02	1.29E-02	1.19E-02
12.0	13.0	2.24E-03	8.97E-03	2.40E-02	3.23E-02	5.51E-02	3.40E-02	2.74E-02	2.78E-02	1.21E-02	9.15E-03
11.0	12.0	3.71E-03	1.61E-02	2.50E-02	4.88E-02	4.99E-02	4.26E-02	3.61E-02	2.65E-02	2.07E-02	1.80E-02
10.0	11.0	2.77E-03	1.70E-02	3.18E-02	4.79E-02	6.76E-02	6.30E-02	4.89E-02	3.59E-02	2.25E-02	1.88E-02

		1510.0 1511.0	1511.0 1512.0	1512.0 1513.0	1513.0 1514.0	1514.0 1515.0	1515.0 1516.0	1516.0 1517.0	1517.0 1518.0	1518.0 1519.0	1519.0 1520.0
19.0	20.0	2.44E-03	3.07E-03	3.34E-03	2.95E-03	1.74E-03	1.79E-03	1.27E-03	1.48E-03	1.01E-03	7.42E-04
18.0	19.0	5.41E-03	5.27E-03	2.95E-03	1.44E-03	2.49E-03	1.58E-03	2.46E-03	2.07E-03	8.13E-04	1.61E-03
17.0	18.0	5.62E-03	5.79E-03	2.95E-03	2.32E-03	3.13E-03	2.35E-03	4.14E-03	2.07E-03	1.24E-03	2.59E-03
16.0	17.0	4.57E-03	5.12E-03	5.14E-03	4.49E-03	3.42E-03	2.47E-03	2.13E-03	2.47E-03	2.00E-03	3.27E-03
15.0	16.0	7.02E-03	6.16E-03	3.78E-03	2.37E-03	4.33E-03	4.75E-03	2.20E-03	3.02E-03	1.96E-03	1.74E-03
14.0	15.0	7.41E-03	6.77E-03	5.61E-03	3.93E-03	3.87E-03	2.37E-03	1.90E-03	4.61E-03	3.33E-03	1.86E-03
13.0	14.0	7.04E-03	9.23E-03	7.27E-03	3.72E-03	4.68E-03	3.55E-03	1.56E-03	2.11E-03	1.65E-03	4.59E-03
12.0	13.0	1.38E-02	1.01E-02	3.98E-03	5.77E-03	5.57E-03	2.86E-03	2.54E-03	5.00E-03	6.41E-03	3.34E-03
11.0	12.0	1.23E-02	9.58E-03	7.47E-03	4.92E-03	3.70E-03	4.48E-03	3.55E-03	5.88E-03	6.04E-03	5.57E-03
10.0	11.0	2.03E-02	1.65E-02	1.15E-02	9.65E-03	7.58E-03	7.94E-03	9.93E-03	7.34E-03	7.64E-03	7.43E-03

		1520.0 1521.0	1521.0 1522.0	1522.0 1523.0	1523.0 1524.0	1524.0 1525.0	1525.0 1526.0	1526.0 1527.0	1527.0 1528.0	1528.0 1529.0	1529.0 1530.0
19.0	20.0	1.74E-03	1.00E-03	9.21E-04	1.20E-03	9.56E-04	9.78E-04	1.35E-03	8.57E-04	5.79E-04	1.32E-03
18.0	19.0	1.44E-03	1.25E-03	1.79E-03	2.45E-03	1.09E-03	1.05E-03	1.64E-03	8.39E-04	1.82E-03	7.23E-04
17.0	18.0	1.68E-03	1.25E-03	2.41E-03	1.56E-03	1.39E-03	1.08E-03	1.59E-03	1.77E-03	1.70E-03	2.16E-03
16.0	17.0	7.22E-04	2.22E-03	1.15E-03	1.55E-03	1.48E-03	2.58E-03	1.98E-03	2.28E-03	2.15E-03	1.33E-03
15.0	16.0	2.10E-03	2.50E-03	2.42E-03	3.35E-03	1.78E-03	2.64E-03	2.74E-03	2.53E-03	4.34E-03	2.87E-03
14.0	15.0	2.76E-03	3.59E-03	3.32E-03	2.23E-03	2.29E-03	1.33E-03	2.11E-03	2.34E-03	3.46E-03	2.09E-03
13.0	14.0	2.42E-03	3.48E-03	4.36E-03	2.20E-03	2.85E-03	3.31E-03	3.10E-03	2.38E-03	1.96E-03	2.14E-03
12.0	13.0	5.69E-03	3.50E-03	4.73E-03	3.63E-03	2.73E-03	3.83E-03	3.10E-03	3.17E-03	3.62E-03	4.51E-03
11.0	12.0	8.06E-03	6.50E-03	4.21E-03	5.28E-03	4.24E-03	3.38E-03	3.27E-03	4.63E-03	3.06E-03	1.01E-02
10.0	11.0	7.48E-03	7.38E-03	8.31E-03	7.87E-03	6.88E-03	6.29E-03	6.69E-03	3.35E-03	5.99E-03	5.36E-03

TABLE VI b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

END CALORIMETER REGION 0

		1500.0 1501.0	1501.0 1502.0	1502.0 1503.0	1503.0 1504.0	1504.0 1505.0	1505.0 1506.0	1506.0 1507.0	1507.0 1508.0	1508.0 1509.0	1509.0 1510.0
19.0	20.0	.36	.37	.36	.43	.36	.38	.38	.36	.50	.42
18.0	19.0	.39	.43	.39	.38	.35	.40	.48	.40	.41	.39
17.0	18.0	.44	.42	.38	.37	.41	.41	.37	.49	.42	.37
16.0	17.0	.46	.38	.35	.35	.35	.35	.38	.39	.46	.41
15.0	16.0	.42	.37	.36	.39	.36	.36	.38	.35	.43	.40
14.0	15.0	.37	.39	.38	.35	.37	.36	.36	.43	.37	.38
13.0	14.0	.35	.38	.36	.36	.36	.37	.35	.37	.39	.40
12.0	13.0	.49	.42	.37	.36	.37	.37	.36	.37	.38	.36
11.0	12.0	.52	.43	.37	.35	.34	.34	.38	.36	.37	.39
10.0	11.0	.44	.42	.36	.35	.36	.38	.38	.43	.40	.46

		1510.0 1511.0	1511.0 1512.0	1512.0 1513.0	1513.0 1514.0	1514.0 1515.0	1515.0 1516.0	1516.0 1517.0	1517.0 1518.0	1518.0 1519.0	1519.0 1520.0
19.0	20.0	.40	.47	.44	.48	.37	.46	.41	.42	.41	.39
18.0	19.0	.44	.52	.46	.44	.44	.52	.46	.39	.48	.48
17.0	18.0	.61	.44	.47	.41	.47	.39	.50	.42	.52	.43
16.0	17.0	.42	.57	.42	.50	.46	.49	.51	.41	.41	.73
15.0	16.0	.43	.47	.40	.47	.77	.43	.40	.43	.37	.39
14.0	15.0	.41	.39	.39	.42	.54	.39	.48	.44	.40	.50
13.0	14.0	.47	.47	.40	.39	.47	.43	.41	.44	.42	.57
12.0	13.0	.42	.45	.42	.42	.42	.42	.39	.42	.46	.43
11.0	12.0	.42	.43	.42	.43	.41	.48	.43	.47	.49	.41
10.0	11.0	.44	.43	.42	.43	.40	.40	.49	.39	.51	.40

		1520.0 1521.0	1521.0 1522.0	1522.0 1523.0	1523.0 1524.0	1524.0 1525.0	1525.0 1526.0	1526.0 1527.0	1527.0 1528.0	1528.0 1529.0	1529.0 1530.0
19.0	20.0	.37	.37	.52	.44	.43	.38	.43	.41	.43	.43
18.0	19.0	.39	.46	.40	.57	.41	.44	.46	.35	.40	.38
17.0	18.0	.47	.36	.49	.41	.44	.43	.45	.41	.42	.48
16.0	17.0	.40	.47	.38	.37	.38	.55	.51	.41	.44	.39
15.0	16.0	.42	.40	.44	.46	.46	.41	.46	.37	.46	.38
14.0	15.0	.47	.46	.50	.49	.46	.38	.40	.37	.40	.37
13.0	14.0	.40	.40	.39	.43	.41	.40	.41	.39	.40	.36
12.0	13.0	.57	.42	.43	.36	.39	.44	.37	.43	.39	.42
11.0	12.0	.42	.43	.44	.41	.49	.36	.42	.43	.39	.54
10.0	11.0	.42	.48	.44	.46	.51	.42	.39	.40	.51	.41

TABLE VII a

ENERGY DENSITY (GeV/cm^3•event) AS A FUNCTION OF RADIUS(DOWN) AND DEPTH(ACROSS) IN cm

		1500.0 1510.0	1510.0 1520.0	1520.0 1530.0	1530.0 1540.0	1540.0 1550.0	1550.0 1560.0	1560.0 1570.0	1570.0 1580.0	1580.0 1590.0	1590.0 1600.0
END CALORIMETER REGION 2											
145.0	150.0	2.02E-05	5.97E-06	3.69E-06	3.65E-06	2.83E-06	1.95E-06	2.94E-06	2.18E-06	1.33E-06	1.31E-06
140.0	145.0	4.02E-05	6.73E-06	4.22E-06	4.19E-06	3.32E-06	4.38E-06	3.03E-06	2.49E-06	2.42E-06	1.63E-06
135.0	140.0	3.67E-05	7.36E-06	5.33E-06	4.29E-06	5.99E-06	3.18E-06	4.91E-06	3.65E-06	2.17E-06	3.19E-06
130.0	135.0	3.95E-05	7.26E-06	6.33E-06	6.68E-06	4.84E-06	4.68E-06	4.21E-06	3.84E-06	2.78E-06	1.38E-06
125.0	130.0	4.02E-05	9.60E-06	6.71E-06	5.62E-06	6.12E-06	5.51E-06	4.36E-06	2.88E-06	2.62E-06	1.76E-06
120.0	125.0	5.02E-05	1.19E-05	7.48E-06	6.56E-06	6.78E-06	5.31E-06	4.59E-06	4.49E-06	3.69E-06	2.77E-06
115.0	120.0	5.05E-05	1.38E-05	1.00E-05	7.97E-06	8.01E-06	7.38E-06	5.33E-06	4.38E-06	3.56E-06	2.72E-06
110.0	115.0	6.69E-05	1.33E-05	1.16E-05	9.76E-06	9.66E-06	7.83E-06	6.58E-06	8.40E-06	3.76E-06	3.87E-06
105.0	110.0	7.84E-05	1.93E-05	9.82E-06	9.34E-06	1.12E-05	7.70E-06	7.01E-06	5.73E-06	4.43E-06	3.28E-06
100.0	105.0	6.46E-05	1.46E-05	2.54E-05	1.00E-05	8.96E-06	9.40E-06	8.08E-06	7.62E-06	4.48E-06	9.76E-06
95.0	100.0	8.82E-05	2.10E-05	1.57E-05	1.61E-05	1.57E-05	1.06E-05	9.67E-06	9.41E-06	5.91E-06	8.02E-06
90.0	95.0	9.69E-05	2.78E-05	1.73E-05	1.57E-05	2.03E-05	1.47E-05	1.26E-05	8.43E-06	7.58E-06	6.11E-06
85.0	90.0	1.14E-04	2.72E-05	2.02E-05	2.04E-05	1.82E-05	1.63E-05	1.08E-05	9.58E-06	7.82E-06	7.52E-06
80.0	85.0	1.42E-04	3.38E-05	2.64E-05	2.61E-05	2.06E-05	1.78E-05	1.52E-05	1.40E-05	1.17E-05	8.53E-06
75.0	80.0	1.70E-04	4.44E-05	4.07E-05	2.82E-05	3.24E-05	2.07E-05	1.90E-05	1.84E-05	1.33E-05	9.51E-06
70.0	75.0	2.04E-04	4.31E-05	3.92E-05	3.78E-05	2.87E-05	2.23E-05	2.19E-05	1.56E-05	1.36E-05	1.01E-05
65.0	70.0	2.77E-04	5.71E-05	4.18E-05	4.21E-05	3.42E-05	3.35E-05	3.17E-05	2.70E-05	1.89E-05	2.10E-05
60.0	65.0	2.84E-04	7.77E-05	6.87E-05	5.26E-05	4.61E-05	4.79E-05	3.97E-05	3.66E-05	3.26E-05	2.32E-05
55.0	60.0	4.03E-04	1.18E-04	8.53E-05	7.24E-05	6.37E-05	5.58E-05	4.84E-05	4.98E-05	3.33E-05	2.65E-05
50.0	55.0	4.53E-04	1.18E-04	9.54E-05	9.54E-05	9.00E-05	6.70E-05	8.32E-05	5.47E-05	4.29E-05	4.26E-05
45.0	50.0	6.88E-04	1.33E-04	1.29E-04	1.08E-04	9.92E-05	8.88E-05	8.53E-05	7.19E-05	7.06E-05	5.99E-05
40.0	45.0	9.23E-04	2.52E-04	1.75E-04	1.56E-04	1.48E-04	1.35E-04	1.09E-04	1.06E-04	9.00E-05	7.48E-05
35.0	40.0	1.31E-03	3.29E-04	2.45E-04	2.47E-04	2.19E-04	1.82E-04	1.71E-04	1.59E-04	1.20E-04	1.27E-04
30.0	35.0	1.90E-03	4.80E-04	3.68E-04	3.16E-04	3.30E-04	2.49E-04	2.54E-04	2.28E-04	2.04E-04	1.81E-04
END CALORIMETER REGION 1											
29.0	30.0	2.45E-03	6.18E-04	4.85E-04	3.84E-04	3.22E-04	3.15E-04	3.14E-04	3.66E-04	2.01E-04	2.37E-04
28.0	29.0	2.43E-03	9.20E-04	4.72E-04	5.64E-04	4.45E-04	3.66E-04	3.67E-04	3.88E-04	2.62E-04	2.64E-04
27.0	28.0	3.26E-03	8.86E-04	4.97E-04	7.07E-04	5.21E-04	4.71E-04	4.62E-04	3.16E-04	2.98E-04	2.40E-04
26.0	27.0	2.99E-03	8.40E-04	4.75E-04	6.32E-04	5.91E-04	5.81E-04	3.76E-04	3.98E-04	4.65E-04	3.19E-04
25.0	26.0	4.04E-03	9.39E-04	7.84E-04	8.59E-04	5.41E-04	5.14E-04	4.27E-04	3.69E-04	4.21E-04	3.18E-04
24.0	25.0	3.97E-03	1.06E-03	7.19E-04	7.19E-04	6.05E-04	5.53E-04	5.15E-04	4.04E-04	3.72E-04	3.54E-04
23.0	24.0	4.94E-03	1.13E-03	5.38E-04	8.40E-04	7.86E-04	6.54E-04	6.29E-04	4.95E-04	4.41E-04	3.25E-04
22.0	23.0	5.07E-03	1.38E-03	9.09E-04	8.80E-04	8.81E-04	7.92E-04	5.92E-04	5.53E-04	4.00E-04	4.29E-04
21.0	22.0	6.94E-03	1.42E-03	9.91E-04	1.06E-03	9.97E-04	8.94E-04	5.91E-04	6.46E-04	4.59E-04	3.86E-04
20.0	21.0	7.28E-03	1.81E-03	1.04E-03	1.09E-03	1.04E-03	8.19E-04	7.86E-04	6.28E-04	5.45E-04	4.95E-04
19.0	20.0	7.40E-03	1.98E-03	1.09E-03	1.01E-03	1.00E-03	9.73E-04	8.73E-04	6.90E-04	6.31E-04	5.00E-04
18.0	19.0	9.29E-03	2.61E-03	1.41E-03	1.22E-03	1.22E-03	1.24E-03	9.90E-04	9.06E-04	7.45E-04	5.04E-04
17.0	18.0	1.11E-02	3.22E-03	1.66E-03	1.70E-03	1.64E-03	1.51E-03	1.02E-03	8.60E-04	9.16E-04	6.41E-04
16.0	17.0	1.13E-02	3.51E-03	1.74E-03	1.89E-03	1.74E-03	1.60E-03	1.08E-03	1.06E-03	9.92E-04	6.05E-04
15.0	16.0	1.67E-02	3.73E-03	2.71E-03	2.61E-03	2.10E-03	1.81E-03	1.09E-03	1.07E-03	1.19E-03	9.79E-04
14.0	15.0	1.82E-02	4.17E-03	2.55E-03	3.31E-03	2.20E-03	1.79E-03	1.89E-03	1.36E-03	1.48E-03	8.68E-04
13.0	14.0	2.06E-02	4.54E-03	2.82E-03	4.06E-03	2.74E-03	2.28E-03	1.71E-03	1.74E-03	1.26E-03	1.02E-03
12.0	13.0	2.33E-02	5.93E-03	3.85E-03	3.43E-03	3.47E-03	2.58E-03	2.21E-03	2.06E-03	1.78E-03	1.40E-03
11.0	12.0	2.87E-02	8.33E-03	5.27E-03	4.20E-03	3.24E-03	2.92E-03	3.05E-03	1.98E-03	2.07E-03	2.02E-03
10.0	11.0	3.58E-02	1.06E-02	6.58E-03	7.29E-03	6.73E-03	7.90E-03	6.65E-03	6.44E-03	5.32E-03	6.55E-03

TABLE VII b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		1500.0 1510.0	1510.0 1520.0	1520.0 1530.0	1530.0 1540.0	1540.0 1550.0	1550.0 1560.0	1560.0 1570.0	1570.0 1580.0	1580.0 1590.0	1590.0 1600.0
END CALORIMETER REGION 2											
145.0	150.0	.08	.11	.14	.14	.09	.10	.19	.22	.18	.24
140.0	145.0	.13	.23	.16	.15	.13	.29	.15	.14	.16	.16
135.0	140.0	.13	.20	.16	.17	.15	.13	.33	.27	.13	.43
130.0	135.0	.15	.15	.14	.20	.17	.12	.13	.23	.28	.12
125.0	130.0	.09	.16	.14	.10	.13	.15	.16	.16	.13	.10
120.0	125.0	.08	.15	.11	.12	.13	.13	.12	.21	.19	.16
115.0	120.0	.09	.09	.21	.12	.08	.14	.08	.10	.14	.12
110.0	115.0	.13	.08	.16	.13	.16	.09	.14	.23	.07	.14
105.0	110.0	.10	.13	.11	.10	.18	.11	.11	.13	.24	.20
100.0	105.0	.08	.12	.52	.09	.09	.15	.07	.18	.11	.68
95.0	100.0	.10	.12	.11	.10	.17	.10	.09	.35	.15	.13
90.0	95.0	.08	.18	.13	.07	.18	.12	.13	.11	.09	.07
85.0	90.0	.07	.14	.10	.13	.11	.17	.08	.11	.08	.13
80.0	85.0	.07	.09	.09	.15	.10	.09	.09	.11	.13	.11
75.0	80.0	.05	.14	.16	.07	.24	.11	.08	.08	.15	.10
70.0	75.0	.08	.13	.08	.09	.11	.06	.10	.10	.11	.11
65.0	70.0	.11	.09	.05	.10	.09	.11	.11	.19	.07	.16
60.0	65.0	.06	.12	.10	.05	.06	.12	.07	.08	.09	.11
55.0	60.0	.11	.09	.14	.10	.08	.11	.06	.10	.11	.06
50.0	55.0	.04	.13	.10	.10	.11	.10	.16	.10	.07	.08
45.0	50.0	.06	.10	.09	.14	.11	.09	.11	.07	.09	.12
40.0	45.0	.08	.09	.09	.09	.09	.11	.07	.11	.09	.08
35.0	40.0	.07	.09	.09	.10	.09	.04	.07	.10	.06	.07
30.0	35.0	.06	.12	.08	.06	.08	.06	.08	.09	.07	.09
END CALORIMETER REGION 1											
29.0	30.0	.09	.11	.13	.15	.09	.12	.09	.19	.09	.10
28.0	29.0	.08	.09	.08	.13	.18	.12	.13	.15	.10	.13
27.0	28.0	.10	.17	.12	.28	.11	.15	.10	.08	.15	.10
26.0	27.0	.11	.09	.10	.12	.09	.15	.06	.18	.16	.13
25.0	26.0	.08	.11	.15	.13	.11	.06	.11	.08	.13	.19
24.0	25.0	.06	.17	.09	.07	.08	.11	.13	.10	.11	.13
23.0	24.0	.07	.15	.14	.09	.14	.11	.15	.17	.10	.06
22.0	23.0	.04	.09	.17	.08	.11	.09	.12	.12	.05	.11
21.0	22.0	.09	.14	.14	.11	.11	.03	.11	.09	.08	.14
20.0	21.0	.07	.10	.10	.14	.14	.10	.07	.17	.13	.16
19.0	20.0	.11	.08	.07	.10	.12	.10	.10	.07	.07	.09
18.0	19.0	.09	.11	.14	.07	.10	.06	.08	.10	.09	.12
17.0	18.0	.08	.11	.04	.12	.15	.15	.07	.06	.11	.15
16.0	17.0	.06	.12	.11	.11	.08	.11	.13	.08	.16	.08
15.0	16.0	.05	.13	.09	.08	.09	.07	.10	.10	.05	.16
14.0	15.0	.07	.08	.13	.18	.16	.09	.09	.12	.17	.16
13.0	14.0	.05	.15	.07	.12	.09	.10	.10	.11	.11	.11
12.0	13.0	.06	.13	.11	.11	.11	.12	.12	.13	.15	.13
11.0	12.0	.03	.08	.11	.17	.14	.12	.16	.10	.11	.12
10.0	11.0	.07	.13	.12	.10	.10	.15	.09	.11	.14	.13

TABLE VIII a

ENERGY DENSITY (GeV/cm^3*event) AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

	1600.0 1650.0	1650.0 1700.0	1700.0 1750.0	1750.0 1800.0	1800.0 1850.0	1850.0 1900.0	1900.0 1950.0	1950. 2000.
END CALORIMETER REGION 5								
145.0 150.0	8.93E-07	1.93E-07	1.95E-08	1.85E-09	2.34E-09	1.96E-09	1.51E-10	7.43E-1
140.0 145.0	7.66E-07	1.26E-07	3.50E-08	1.99E-09	5.72E-09	2.70E-10	2.83E-09	5.13E-1
135.0 140.0	7.64E-07	1.58E-07	8.32E-08	3.86E-09	3.80E-09	2.48E-10	1.41E-09	1.04E-1
130.0 135.0	9.99E-07	2.14E-07	5.33E-08	3.38E-08	2.29E-09	4.39E-09	5.04E-10	1.40E-1
125.0 130.0	9.88E-07	3.05E-07	7.12E-08	7.41E-09	2.40E-09	6.83E-10	6.04E-09	2.22E-1
120.0 125.0	1.09E-06	3.34E-07	1.11E-07	2.08E-08	6.76E-09	7.67E-09	9.26E-10	3.66E-1
115.0 120.0	1.52E-06	5.19E-07	9.99E-08	3.20E-08	9.90E-09	1.41E-08	8.68E-10	5.09E-1
110.0 115.0	2.11E-06	4.58E-07	1.23E-07	1.92E-08	1.21E-08	7.91E-09	1.37E-09	8.19E-1
105.0 110.0	1.84E-06	5.14E-07	1.42E-07	2.75E-08	4.12E-09	2.72E-08	2.30E-09	2.59E-0
100.0 105.0	2.22E-06	7.35E-07	1.75E-07	5.00E-08	8.33E-09	3.29E-09	3.12E-09	2.41E-0
95.0 100.0	2.90E-06	9.48E-07	2.36E-07	3.66E-08	8.44E-09	2.04E-08	7.01E-09	6.24E-0
90.0 95.0	3.53E-06	1.01E-06	2.27E-07	5.16E-08	1.43E-08	1.11E-08	6.10E-09	9.21E-0
85.0 90.0	4.08E-06	1.17E-06	2.52E-07	6.08E-08	1.43E-08	9.24E-08	2.37E-08	2.03E-0
80.0 85.0	5.31E-06	1.24E-06	3.74E-07	9.57E-08	2.67E-08	3.11E-08	2.16E-08	2.66E-0
75.0 80.0	6.71E-06	1.87E-06	6.87E-07	2.86E-07	3.60E-08	3.51E-08	2.99E-08	8.16E-0
70.0 75.0	7.55E-06	2.82E-06	8.36E-07	2.36E-07	7.15E-08	8.13E-08	8.35E-08	2.83E-0
65.0 70.0	1.00E-05	3.41E-06	9.28E-07	3.26E-07	1.20E-07	9.28E-07	1.33E-07	3.79E-0
60.0 65.0	1.33E-05	4.80E-06	1.53E-06	4.44E-07	2.65E-07	4.47E-07	1.52E-07	2.87E-0
55.0 60.0	1.68E-05	7.21E-06	2.05E-06	6.52E-07	5.53E-07	3.62E-07	4.81E-07	4.58E-0
50.0 55.0	2.53E-05	8.41E-06	3.13E-06	1.11E-06	1.29E-06	7.91E-07	4.57E-07	1.04E-0
END CALORIMETER REGION 4								
45.0 50.0	3.25E-05	1.21E-05	4.55E-06	1.85E-06	1.56E-06	1.67E-06	1.12E-06	1.44E-0
40.0 45.0	4.42E-05	1.87E-05	5.25E-06	3.16E-06	2.61E-06	6.36E-06	2.02E-06	1.82E-0
35.0 40.0	6.32E-05	2.66E-05	9.14E-06	6.51E-06	4.53E-06	8.67E-06	3.02E-06	3.66E-0
30.0 35.0	1.07E-04	4.28E-05	1.46E-05	9.33E-06	1.02E-05	9.49E-06	5.85E-06	7.76E-0
END CALORIMETER REGION 3								
29.0 30.0	1.44E-04	4.70E-05	1.98E-05	1.14E-05	1.67E-05	1.83E-05	7.15E-06	8.35E-0
28.0 29.0	1.37E-04	5.42E-05	2.48E-05	1.55E-05	2.12E-05	1.54E-05	1.22E-05	1.36E-0
27.0 28.0	1.45E-04	4.80E-05	2.59E-05	1.99E-05	2.43E-05	1.92E-05	1.50E-05	1.50E-0
26.0 27.0	1.49E-04	6.79E-05	3.18E-05	1.92E-05	2.15E-05	2.76E-05	3.58E-05	1.32E-0
25.0 26.0	1.66E-04	7.36E-05	2.81E-05	2.62E-05	3.26E-05	2.16E-05	1.58E-05	1.87E-0
24.0 25.0	1.90E-04	1.08E-04	3.22E-05	2.44E-05	3.10E-05	2.88E-05	1.96E-05	2.66E-0
23.0 24.0	2.31E-04	8.53E-05	3.84E-05	4.05E-05	3.55E-05	3.82E-05	3.17E-05	2.89E-0
22.0 23.0	2.33E-04	9.02E-05	4.36E-05	4.13E-05	4.09E-05	3.98E-05	3.42E-05	3.59E-0
21.0 22.0	2.37E-04	1.49E-04	7.18E-05	5.43E-05	5.63E-05	4.94E-05	6.11E-05	5.24E-0
20.0 21.0	3.12E-04	1.52E-04	7.46E-05	5.33E-05	6.42E-05	6.97E-05	4.14E-05	6.20E-0
19.0 20.0	3.90E-04	1.49E-04	9.10E-05	6.71E-05	1.06E-04	9.74E-05	5.33E-05	6.94E-0
18.0 19.0	4.36E-04	1.71E-04	8.89E-05	1.12E-04	1.04E-04	1.16E-04	1.58E-04	7.80E-0
17.0 18.0	3.85E-04	2.38E-04	1.45E-04	9.68E-05	1.27E-04	1.02E-04	1.04E-04	9.82E-0
16.0 17.0	6.12E-04	2.36E-04	1.35E-04	1.21E-04	1.21E-04	1.55E-04	1.49E-04	1.44E-04
15.0 16.0	6.69E-04	2.33E-04	1.63E-04	1.90E-04	1.74E-04	1.63E-04	1.50E-04	1.84E-04
14.0 15.0	7.42E-04	4.42E-04	1.82E-04	2.33E-04	2.99E-04	2.38E-04	2.84E-04	1.69E-04
13.0 14.0	7.27E-04	3.72E-04	3.18E-04	2.81E-04	2.89E-04	4.13E-04	3.44E-04	3.81E-04
12.0 13.0	9.46E-04	5.03E-04	4.27E-04	4.48E-04	6.13E-04	4.80E-04	4.86E-04	5.31E-04
11.0 12.0	1.30E-03	1.06E-03	1.07E-03	9.30E-04	1.21E-03	1.10E-03	9.45E-04	1.28E-03
10.0 11.0	5.47E-03	5.88E-03	5.56E-03	5.48E-03	5.18E-03	5.68E-03	5.24E-03	5.32E-03

TABLE VIII b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

	1600.0 1650.0	1650.0 1700.0	1700.0 1750.0	1750.0 1800.0	1800.0 1850.0	1850.0 1900.0	1900.0 1950.0	1950. 2000.
END CALORIMETER REGION 5								
145.0 150.0	.12	.37	.18	.44	.84	.91	.25	.3
140.0 145.0	.11	.11	.26	.22	.66	.28	.94	.4
135.0 140.0	.12	.14	.40	.53	.76	.45	.83	.3
130.0 135.0	.16	.16	.25	.87	.66	.84	.41	.2
125.0 130.0	.15	.23	.26	.23	.50	.42	.93	.3
120.0 125.0	.09	.30	.29	.45	.72	.93	.42	.3
115.0 120.0	.12	.32	.28	.34	.47	.92	.24	.4
110.0 115.0	.10	.19	.29	.23	.67	.83	.42	.4
105.0 110.0	.11	.19	.27	.35	.16	.88	.30	.7
100.0 105.0	.13	.16	.31	.40	.41	.24	.33	.4
95.0 100.0	.16	.20	.23	.40	.25	.65	.31	.6
90.0 95.0	.20	.16	.18	.25	.41	.28	.39	.5
85.0 90.0	.08	.15	.19	.20	.21	.74	.46	.6
80.0 85.0	.16	.14	.20	.24	.33	.50	.28	.5
75.0 80.0	.10	.13	.28	.35	.21	.31	.38	.5
70.0 75.0	.10	.14	.21	.21	.23	.25	.39	.8
65.0 70.0	.07	.17	.12	.19	.13	.88	.48	.7
60.0 65.0	.07	.11	.09	.19	.22	.48	.28	.4
55.0 60.0	.08	.13	.11	.19	.35	.33	.43	.4
50.0 55.0	.12	.08	.13	.17	.36	.23	.21	.4
END CALORIMETER REGION 4								
45.0 50.0	.08	.09	.06	.16	.23	.25	.34	.2
40.0 45.0	.08	.11	.12	.08	.22	.65	.19	.2
35.0 40.0	.04	.05	.08	.13	.16	.45	.20	.2
30.0 35.0	.05	.11	.08	.14	.21	.26	.13	.2
END CALORIMETER REGION 3								
29.0 30.0	.09	.11	.08	.13	.17	.44	.16	.1
28.0 29.0	.08	.19	.16	.12	.23	.12	.13	.2
27.0 28.0	.09	.10	.17	.22	.24	.25	.18	.0
26.0 27.0	.07	.15	.28	.16	.22	.16	.41	.1
25.0 26.0	.08	.11	.11	.16	.20	.13	.16	.1
24.0 25.0	.08	.26	.12	.17	.18	.24	.16	.2
23.0 24.0	.09	.15	.17	.21	.19	.14	.11	.1
22.0 23.0	.08	.09	.10	.13	.18	.22	.10	.2
21.0 22.0	.09	.23	.26	.16	.16	.27	.32	.1
20.0 21.0	.09	.17	.14	.08	.11	.35	.11	.3
19.0 20.0	.09	.07	.13	.07	.13	.19	.11	.1
18.0 19.0	.14	.09	.07	.16	.14	.26	.37	.2
17.0 18.0	.06	.10	.10	.09	.16	.12	.22	.1
16.0 17.0	.20	.10	.09	.10	.08	.23	.20	.1
15.0 16.0	.11	.09	.12	.12	.12	.15	.17	.17
14.0 15.0	.10	.09	.08	.16	.20	.25	.20	.3
13.0 14.0	.10	.10	.15	.18	.20	.19	.16	.24
12.0 13.0	.09	.07	.10	.13	.22	.21	.15	.2
11.0 12.0	.09	.08	.16	.17	.12	.17	.10	.18
10.0 11.0	.04	.06	.08	.08	.07	.06	.07	.09

TABLE IX a

ENERGY DENSITY (GeV/cm^3•event) AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		1500.0 1550.0	1550.0 1600.0	1600.0 1650.0	1650.0 1700.0	1700.0 1750.0	1750.0 1800.0	1800.0 1850.0	1850.0 1900.0	1900.0 1950.0	1950.0 2000.0
END CALORIMETER REGION 8											
240.0	250.0	2.62E-09	1.42E-10	3.82E-10	1.13E-10	3.52E-11	5.18E-11	3.03E-12	3.86E-13	1.74E-12	1.80E-13
230.0	240.0	2.35E-09	1.16E-09	1.68E-09	1.66E-10	4.43E-11	8.32E-11	2.55E-12	8.57E-13	1.84E-12	6.75E-13
220.0	230.0	5.56E-09	4.22E-09	1.65E-09	3.14E-10	1.52E-10	6.62E-11	2.86E-12	1.60E-12	1.16E-11	1.55E-12
210.0	220.0	2.23E-08	2.19E-08	2.80E-09	8.42E-10	3.68E-10	1.47E-10	4.33E-12	2.60E-12	1.65E-11	1.79E-12
200.0	210.0	9.77E-08	4.25E-08	5.98E-09	2.83E-09	1.88E-09	2.05E-10	6.44E-12	6.28E-12	3.91E-11	1.66E-12
190.0	200.0	6.68E-08	7.25E-08	1.20E-08	8.85E-09	6.45E-09	1.04E-10	3.43E-11	1.24E-11	6.21E-11	2.59E-12
180.0	190.0	9.98E-08	2.23E-07	3.29E-08	1.12E-08	1.50E-08	7.09E-10	9.51E-11	1.66E-11	1.32E-10	5.07E-12
170.0	180.0	2.05E-07	1.82E-07	6.89E-08	3.05E-08	1.85E-08	4.35E-09	6.94E-11	1.73E-10	1.88E-10	9.56E-12
160.0	170.0	1.20E-06	5.82E-07	1.76E-07	7.18E-08	4.07E-08	3.49E-09	1.23E-10	3.60E-10	5.78E-10	2.43E-11
150.0	160.0	2.74E-06	1.41E-06	4.23E-07	1.56E-07	5.53E-08	5.23E-09	4.53E-10	3.97E-08	7.86E-10	3.14E-11
		2000.0 2050.0	2050.0 2100.0	2100.0 2150.0	2150.0 2200.0	2200.0 2250.0	2250.0 2300.0	2300.0 2350.0	2350.0 2400.0	2400.0 2450.0	2450.0 2500.0
END CALORIMETER REGION 7											
45.0	50.0	1.02E-06	8.98E-07	1.01E-06	1.25E-06	1.03E-06	9.17E-07	8.31E-07	1.11E-06	9.30E-07	1.08E-06
40.0	45.0	2.43E-06	1.98E-06	1.61E-06	1.99E-06	1.81E-06	1.84E-06	1.70E-06	2.91E-06	2.87E-06	2.58E-06
35.0	40.0	3.94E-06	4.35E-06	3.01E-06	3.78E-06	4.44E-06	3.34E-06	3.75E-06	3.56E-06	2.86E-06	3.14E-06
30.0	35.0	8.31E-06	9.29E-06	7.49E-06	7.11E-06	6.24E-06	8.25E-06	9.61E-06	6.41E-06	6.77E-06	5.53E-06
END CALORIMETER REGION 6											
29.0	30.0	1.12E-05	1.16E-05	9.02E-06	1.31E-05	9.96E-06	6.34E-06	8.68E-06	9.63E-06	1.32E-05	8.69E-06
28.0	29.0	1.79E-05	1.00E-05	1.12E-05	1.68E-05	8.77E-06	1.10E-05	2.00E-05	1.47E-05	1.50E-05	1.00E-05
27.0	28.0	2.23E-05	1.74E-05	1.45E-05	1.59E-05	8.28E-06	1.67E-05	2.20E-05	1.84E-05	1.39E-05	1.41E-05
26.0	27.0	1.95E-05	2.39E-05	1.88E-05	1.80E-05	1.54E-05	1.77E-05	1.53E-05	1.36E-05	2.03E-05	2.95E 05
25.0	26.0	2.63E-05	3.18E-05	1.51E-05	1.80E-05	1.65E-05	2.45E-05	1.82E-05	1.46E-05	2.43E-05	1.53E-05
24.0	25.0	2.56E-05	2.50E-05	2.04E-05	2.80E-05	1.95E-05	3.41E-05	3.27E-05	2.10E-05	1.89E-05	2.29E-05
23.0	24.0	3.42E-05	2.24E-05	2.28E-05	2.87E-05	2.49E-05	2.31E-05	3.88E-05	4.31E-05	3.10E-05	3.62E-05
22.0	23.0	3.74E-05	2.90E-05	3.20E-05	2.60E-05	2.49E-05	2.58E-05	4.12E-05	4.43E-05	2.57E-05	2.47E-05
21.0	22.0	3.92E-05	3.39E-05	3.49E-05	4.17E-05	3.06E-05	2.47E-05	4.75E-05	4.12E-05	4.26E-05	4.31E-05
20.0	21.0	4.15E-05	4.31E-05	5.47E-05	3.87E-05	4.31E-05	4.85E-05	7.80E-05	4.26E-05	5.76E-05	4.20E-05
19.0	20.0	5.87E-05	6.01E-05	5.83E-05	5.30E-05	5.95E-05	8.35E-05	9.38E-05	9.16E-05	5.25E-05	4.01E-05
18.0	19.0	8.49E-05	8.50E-05	7.62E-05	1.22E-04	7.16E-05	1.13E-04	6.41E-05	8.97E-05	7.48E-05	6.30E-05
17.0	18.0	8.39E-05	9.53E-05	6.94E-05	9.91E-05	1.27E-04	6.93E-05	9.35E-05	1.13E-04	1.34E-04	7.91E-05
16.0	17.0	1.40E-04	9.10E-05	1.28E-04	1.18E-04	1.72E-04	1.33E-04	9.24E-05	1.34E-04	1.13E-04	1.06E-04
15.0	16.0	1.50E-04	1.21E-04	1.48E-04	2.24E-04	1.69E-04	1.37E-04	1.57E-04	1.62E-04	1.44E-04	1.20E-04
14.0	15.0	2.59E-04	2.25E-04	2.27E-04	1.56E-04	2.40E-04	1.76E-04	2.07E-04	2.57E-04	1.95E-04	1.38E-04
13.0	14.0	2.53E-04	3.19E-04	3.08E-04	2.38E-04	3.20E-04	4.77E-04	3.35E-04	3.82E-04	2.70E-04	2.61E-04
12.0	13.0	5.17E-04	5.77E-04	4.22E-04	4.36E-04	5.82E-04	5.07E-04	6.79E-04	4.25E-04	4.94E-04	2.87E-04
11.0	12.0	9.22E-04	1.03E-03	1.03E-03	1.07E-03	9.27E-04	1.02E-03	1.22E-03	1.18E-03	9.01E-04	9.05E-04
10.0	11.0	5.91E-03	5.43E-03	5.73E-03	5.47E-03	6.03E-03	5.28E-03	6.03E-03	6.37E-03	6.61E-03	4.95E-03

TABLE IX b

RELATIVE ERROR OF ENERGY DENSITY AS A FUNCTION OF RADIUS (DOWN) AND DEPTH (ACROSS) IN cm

		1500.0 1550.0	1550.0 1600.0	1600.0 1650.0	1650.0 1700.0	1700.0 1750.0	1750.0 1800.0	1800.0 1850.0	1850.0 1900.0	1900.0 1950.0	1950.0 2000.0
END CALORIMETER REGION 8											
240.0	250.0	.44	.38	.67	.40	.47	.87	.69	.36	.87	.37
230.0	240.0	.17	.56	.56	.36	.19	.81	.38	.50	.78	.62
220.0	230.0	.20	.87	.55	.41	.28	.52	.31	.43	.93	.76
210.0	220.0	.47	.90	.57	.38	.35	.74	.32	.47	.75	.54
200.0	210.0	.80	.86	.58	.31	.60	.73	.28	.39	.73	.35
190.0	200.0	.37	.73	.47	.46	.68	.23	.47	.35	.63	.33
180.0	190.0	.42	.73	.44	.23	.58	.59	.58	.32	.63	.27
170.0	180.0	.37	.22	.19	.28	.73	.67	.25	.85	.72	.37
160.0	170.0	.41	.15	.23	.25	.75	.49	.32	.82	.93	.34
150.0	160.0	.15	.14	.11	.41	.77	.62	.69	.99	.91	.33
		2000.0 2050.0	2050.0 2100.0	2100.0 2150.0	2150.0 2200.0	2200.0 2250.0	2250.0 2300.0	2300.0 2350.0	2350.0 2400.0	2400.0 2450.0	2450.0 2500.0
END CALORIMETER REGION 7											
45.0	50.0	.19	.17	.22	.20	.30	.19	.22	.28	.23	.29
40.0	45.0	.20	.16	.11	.11	.18	.23	.15	.33	.36	.41
35.0	40.0	.13	.14	.22	.19	.28	.25	.12	.20	.27	.21
30.0	35.0	.19	.19	.14	.15	.12	.23	.20	.16	.20	.17
END CALORIMETER REGION 6											
29.0	30.0	.19	.16	.15	.17	.22	.26	.20	.19	.24	.34
28.0	29.0	.31	.15	.18	.23	.26	.23	.29	.26	.33	.24
27.0	28.0	.26	.18	.36	.25	.23	.36	.28	.29	.23	.18
26.0	27.0	.16	.29	.18	.14	.13	.22	.20	.23	.20	.49
25.0	26.0	.29	.34	.14	.24	.33	.55	.22	.21	.13	.16
24.0	25.0	.10	.15	.18	.19	.17	.52	.30	.17	.21	.22
23.0	24.0	.18	.16	.16	.27	.26	.31	.34	.44	.12	.31
22.0	23.0	.21	.08	.18	.22	.22	.13	.16	.25	.15	.12
21.0	22.0	.16	.11	.23	.24	.12	.09	.22	.17	.13	.20
20.0	21.0	.09	.10	.19	.14	.14	.17	.25	.18	.16	.09
19.0	20.0	.12	.12	.08	.11	.20	.26	.15	.39	.10	.11
18.0	19.0	.12	.13	.28	.23	.16	.22	.15	.18	.13	.14
17.0	18.0	.10	.09	.11	.20	.26	.11	.18	.24	.25	.22
16.0	17.0	.20	.12	.19	.22	.37	.15	.18	.25	.14	.29
15.0	16.0	.15	.16	.27	.32	.17	.13	.16	.17	.13	.14
14.0	15.0	.16	.23	.19	.23	.32	.19	.21	.14	.18	.12
13.0	14.0	.20	.12	.19	.16	.19	.44	.25	.21	.25	.20
12.0	13.0	.19	.16	.09	.20	.20	.26	.22	.10	.17	.16
11.0	12.0	.15	.23	.21	.15	.17	.09	.23	.17	.12	.18
10.0	11.0	.08	.07	.11	.07	.09	.06	.08	.09	.07	.10

FIGURE CAPTIONS

Fig. 1. Geometry assumed for a large SSC detector in the Monte Carlo calculation. The muon detectors (dotted areas) were neglected, i.e., replaced with vacuum.

Fig. 2. Volume bins in which energy deposition is calculated for the Central Calorimeter. Results of calculation are in Tables III-VI.

Fig. 3. Volume bins in which energy deposition is calculated for the End Calorimeter(s). Results of calculation are in Tables VII-IX.

Fig. 4. Energy deposition, ρ_E, in GeV/cm^3•event, in the berryllium beampipe as a function of distance along beam measured from interaction point.

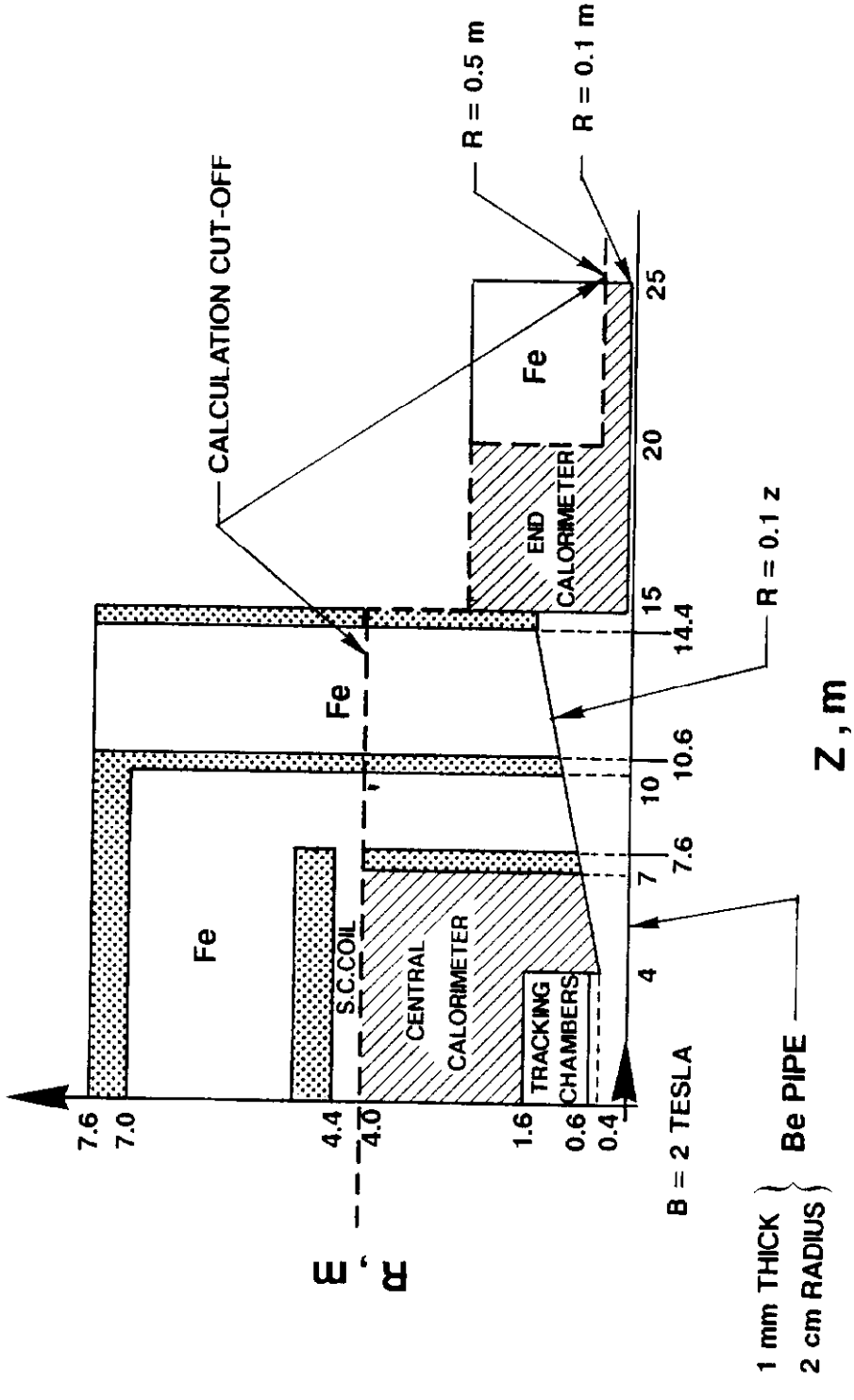
CALCULATION CUT-OFF
R = 0.5 m
R = 0.1 m
R = 0.1 z
Fe
Fe
Fe
END CALORIMETER
S.C.COIL
CENTRAL CALORIMETER
TRACKING CHAMBERS
B = 2 TESLA
1 mm THICK
2 cm RADIUS
Be PIPE
R , m
Z , m
7.6
7.0
4.4
4.0
1.6
0.6
0.4
4
7
10
15
20
25
7.6
10.6
14.4

Fig. 1

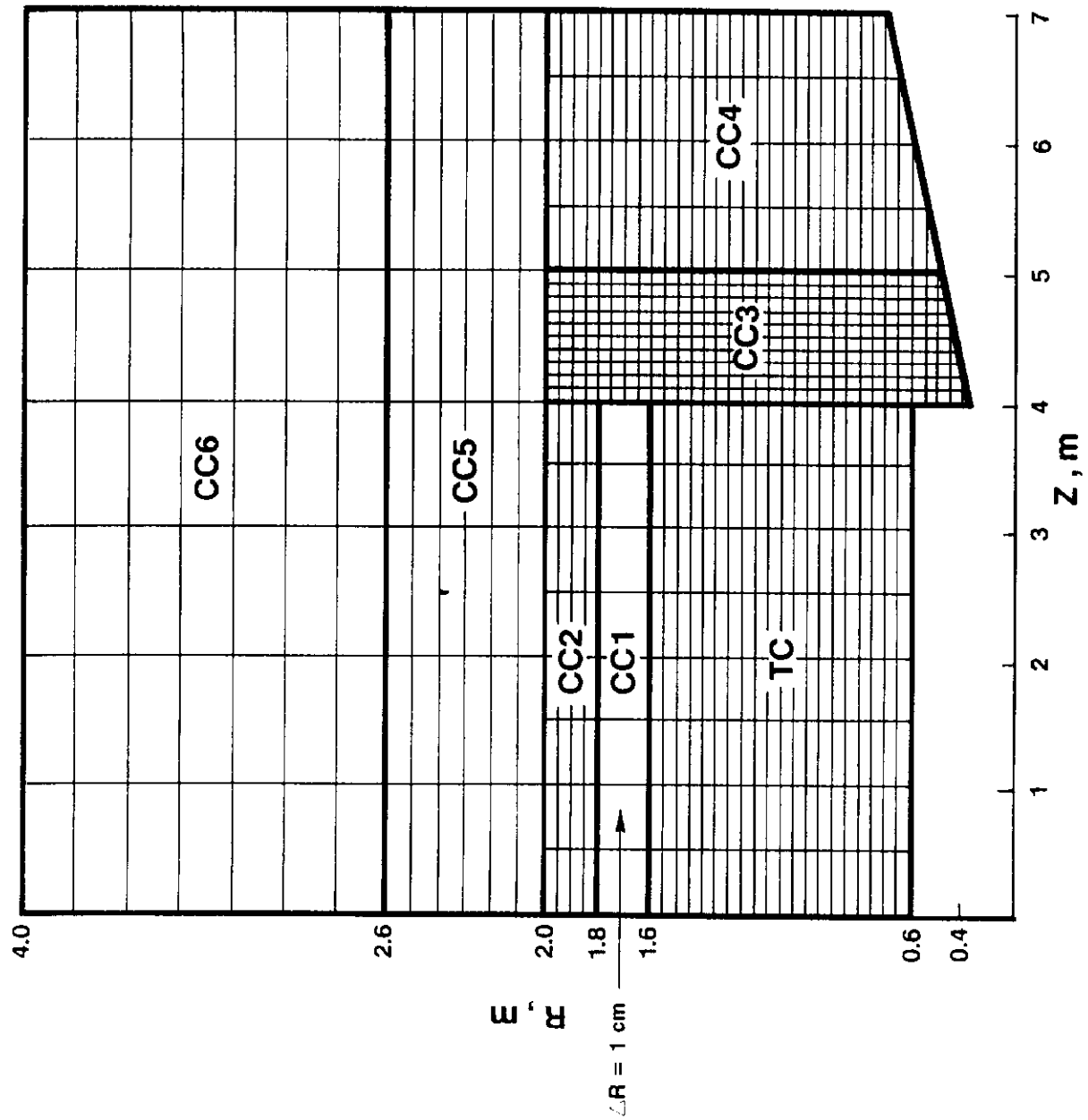
CC6
CC5
CC4
CC3
CC2
CC1
TC
4.0
2.6
2.0
1.8
1.6
0.6
0.4
R , m
ΔR = 1 cm
1
2
3
4
5
6
7
Z , m

Fig. 2

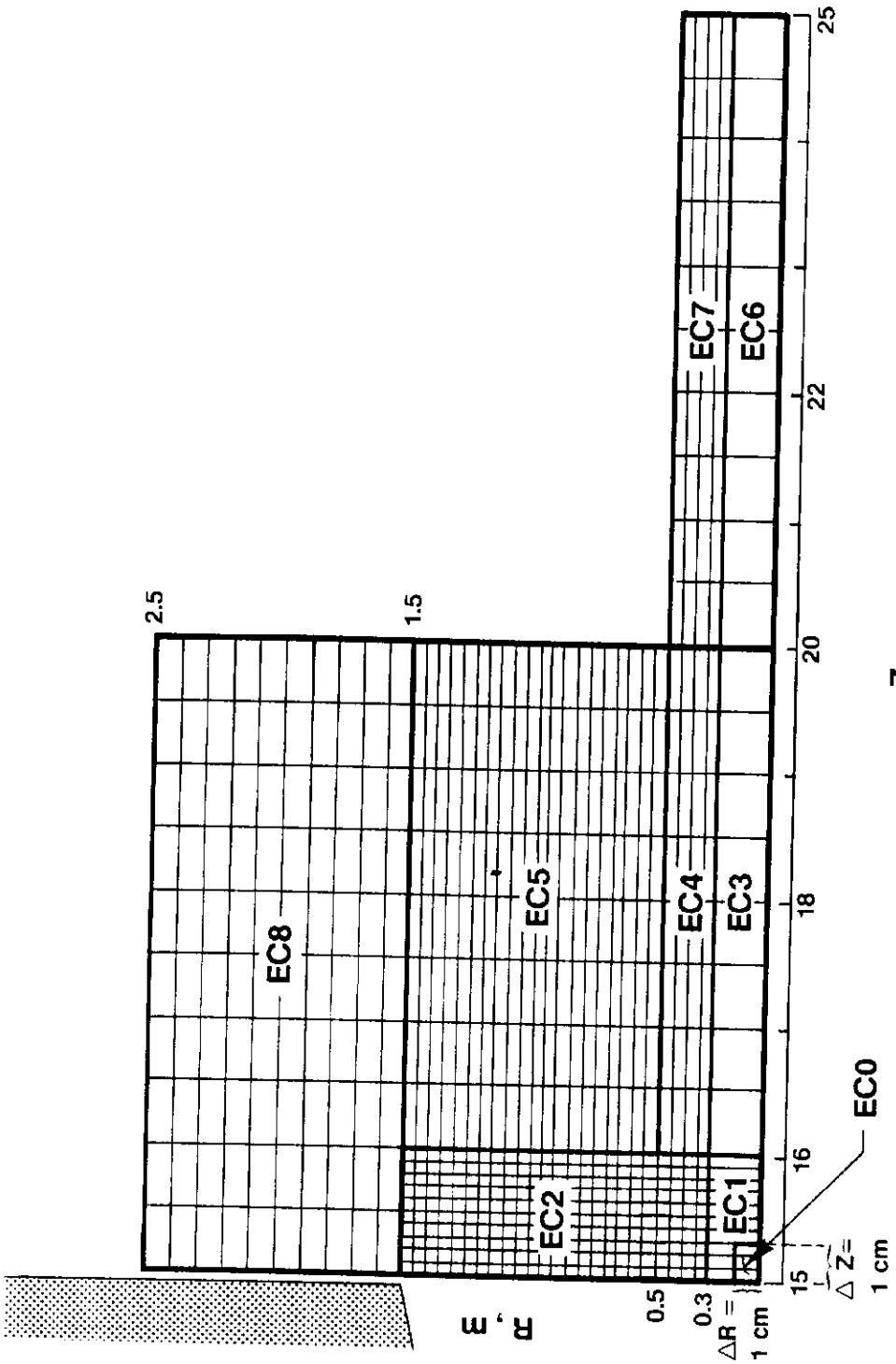
EC8
EC5
EC4
EC3
EC7
EC6
EC2
EC1
EC0
2.5
1.5
0.5
0.3
ΔR = 1 cm
15
16
18
20
22
25
Δ Z= 1 cm
R , m
Z , m

Fig. 3

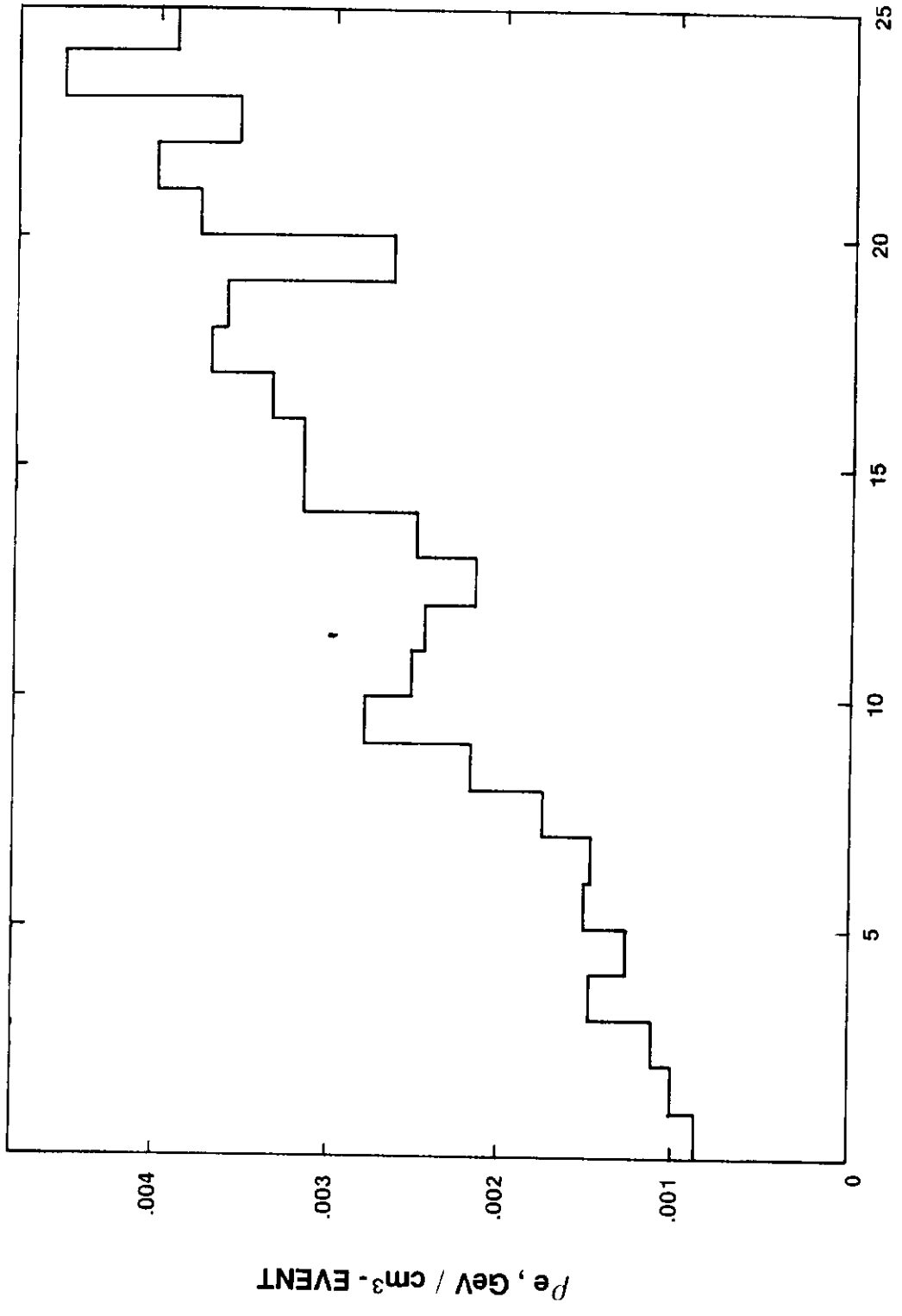

Fig. 4