

## Muons in UM rock for Doug

	$\langle Z/A \rangle$	$\rho$ [g/cm <sup>3</sup> ]	$I$ [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
	0.49407	2.700	152.7	0.14240	3.0000	0.2000	3.0000	4.0469	0.00
$T$	$p$ [MeV/c]	Ionization	Brems	Pair prod	Photonucl	Total	CSDA range [g/cm <sup>2</sup> ]		
				[MeV cm <sup>2</sup> /g]					
10.0 MeV	$4.704 \times 10^1$	6.437				6.437	$8.649 \times 10^{-1}$		
14.0 MeV	$5.616 \times 10^1$	5.040				5.040	$1.574 \times 10^0$		
20.0 MeV	$6.802 \times 10^1$	3.951				3.951	$2.934 \times 10^0$		
30.0 MeV	$8.509 \times 10^1$	3.076				3.076	$5.842 \times 10^0$		
40.0 MeV	$1.003 \times 10^2$	2.633				2.633	$9.378 \times 10^0$		
80.0 MeV	$1.527 \times 10^2$	1.988				1.988	$2.741 \times 10^1$		
100. MeV	$1.764 \times 10^2$	1.871				1.871	$3.780 \times 10^1$		
140. MeV	$2.218 \times 10^2$	1.747				1.747	$6.003 \times 10^1$		
200. MeV	$2.868 \times 10^2$	1.678				1.678	$9.521 \times 10^1$		
293. MeV	$3.844 \times 10^2$	1.656			0.000	1.656	<i>Minimum ionization</i>		
300. MeV	$3.917 \times 10^2$	1.656			0.000	1.656	$1.554 \times 10^2$		
400. MeV	$4.945 \times 10^2$	1.667			0.000	1.667	$2.156 \times 10^2$		
800. MeV	$8.995 \times 10^2$	1.743	0.000		0.000	1.744	$4.502 \times 10^2$		
1.00 GeV	$1.101 \times 10^3$	1.777	0.000		0.000	1.778	$5.637 \times 10^2$		
1.40 GeV	$1.502 \times 10^3$	1.831	0.001	0.000	0.001	1.832	$7.852 \times 10^2$		
2.00 GeV	$2.103 \times 10^3$	1.890	0.001	0.000	0.001	1.893	$1.107 \times 10^3$		
3.00 GeV	$3.104 \times 10^3$	1.958	0.002	0.001	0.001	1.962	$1.625 \times 10^3$		
4.00 GeV	$4.104 \times 10^3$	2.005	0.002	0.002	0.002	2.011	$2.128 \times 10^3$		
8.00 GeV	$8.105 \times 10^3$	2.112	0.006	0.005	0.004	2.127	$4.056 \times 10^3$		
10.0 GeV	$1.011 \times 10^4$	2.144	0.007	0.008	0.005	2.164	$4.988 \times 10^3$		
14.0 GeV	$1.411 \times 10^4$	2.190	0.011	0.012	0.006	2.221	$6.811 \times 10^3$		
20.0 GeV	$2.011 \times 10^4$	2.237	0.018	0.020	0.009	2.284	$9.474 \times 10^3$		
30.0 GeV	$3.011 \times 10^4$	2.286	0.029	0.035	0.013	2.364	$1.377 \times 10^4$		
40.0 GeV	$4.011 \times 10^4$	2.320	0.041	0.052	0.017	2.430	$1.795 \times 10^4$		
80.0 GeV	$8.011 \times 10^4$	2.395	0.092	0.125	0.033	2.646	$3.369 \times 10^4$		
100. GeV	$1.001 \times 10^5$	2.418	0.120	0.165	0.041	2.744	$4.112 \times 10^4$		
140. GeV	$1.401 \times 10^5$	2.453	0.176	0.246	0.057	2.932	$5.521 \times 10^4$		
200. GeV	$2.001 \times 10^5$	2.489	0.265	0.376	0.081	3.210	$7.476 \times 10^4$		
300. GeV	$3.001 \times 10^5$	2.530	0.416	0.595	0.121	3.663	$1.039 \times 10^5$		
400. GeV	$4.001 \times 10^5$	2.559	0.573	0.823	0.161	4.117	$1.296 \times 10^5$		
641. GeV	$6.407 \times 10^5$	2.607	0.962	1.386	0.259	5.215	<i>Muon critical energy</i>		
800. GeV	$8.001 \times 10^5$	2.630	1.225	1.766	0.325	5.947	$2.100 \times 10^5$		
1.00 TeV	$1.000 \times 10^6$	2.653	1.561	2.251	0.409	6.874	$2.413 \times 10^5$		
1.40 TeV	$1.400 \times 10^6$	2.688	2.236	3.216	0.580	8.721	$2.929 \times 10^5$		
2.00 TeV	$2.000 \times 10^6$	2.726	3.272	4.694	0.839	11.531	$3.525 \times 10^5$		
3.00 TeV	$3.000 \times 10^6$	2.769	5.005	7.152	1.285	16.211	$4.253 \times 10^5$		
4.00 TeV	$4.000 \times 10^6$	2.800	6.766	9.640	1.738	20.944	$4.795 \times 10^5$		
8.00 TeV	$8.000 \times 10^6$	2.877	13.880	19.656	3.623	40.036	$6.153 \times 10^5$		
10.0 TeV	$1.000 \times 10^7$	2.902	17.472	24.696	4.594	49.664	$6.600 \times 10^5$		
14.0 TeV	$1.400 \times 10^7$	2.940	24.642	34.744	6.590	68.917	$7.281 \times 10^5$		
20.0 TeV	$2.000 \times 10^7$	2.982	35.477	49.891	9.656	98.006	$8.008 \times 10^5$		
30.0 TeV	$3.000 \times 10^7$	3.030	53.504	75.099	14.970	146.603	$8.836 \times 10^5$		
40.0 TeV	$4.000 \times 10^7$	3.064	71.611	100.381	20.420	195.476	$9.425 \times 10^5$		
80.0 TeV	$8.000 \times 10^7$	3.149	144.209	201.589	43.253	392.200	$1.084 \times 10^6$		
100. TeV	$1.000 \times 10^8$	3.177	180.596	252.248	55.075	491.097	$1.130 \times 10^6$		