Comparison of Power Depositions

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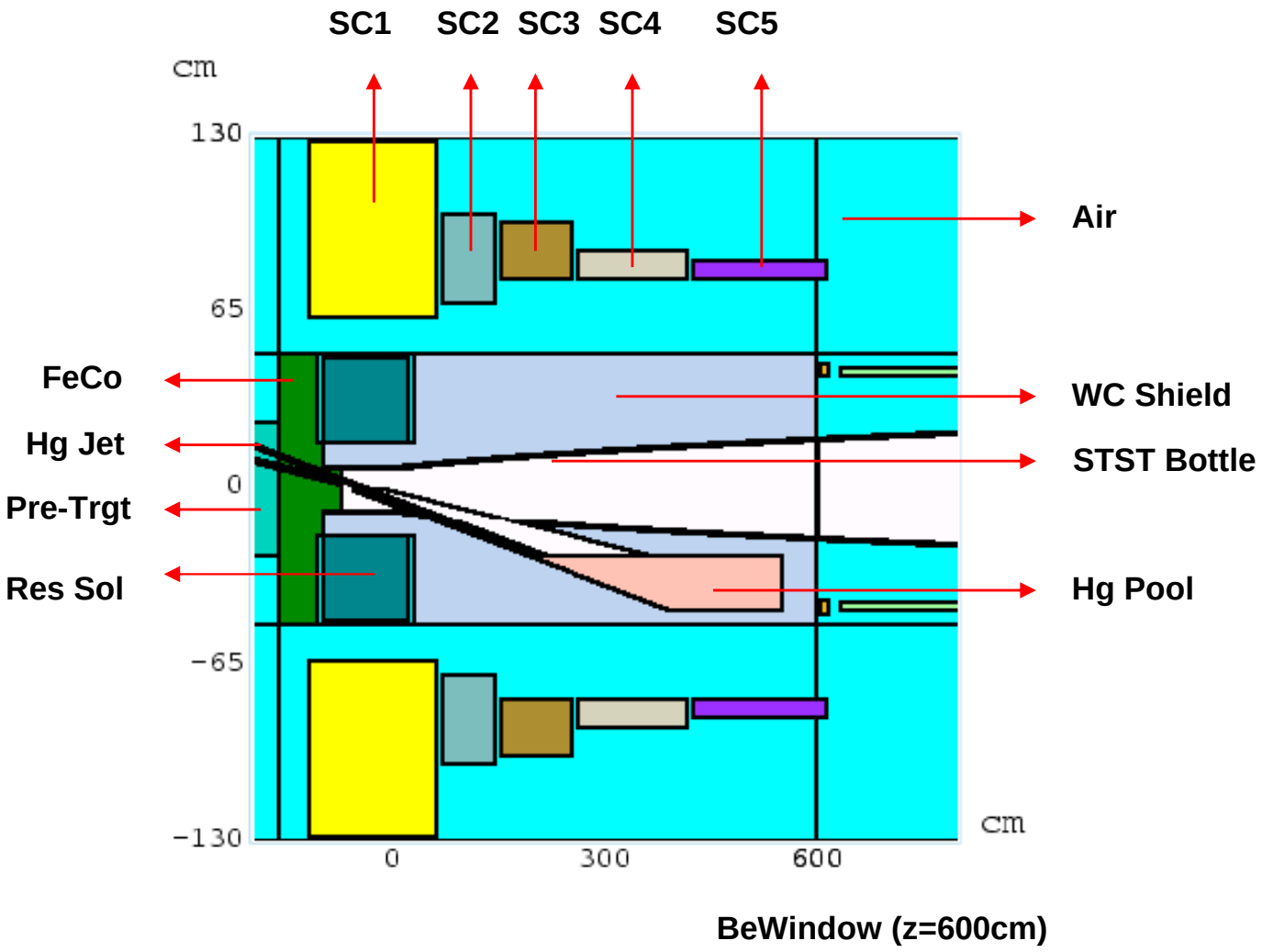
Part 1: Vary Shielding Material

Part1: Introduction

- Using MARS15 to study energy deposition.
- Study II geometry and magnetic field map.
- Using optimized target parameters for Hg jet & Proton Beam (length of 75cm on z-axis, radius of 4mm for target, tilt of 78.13 mrad for beam and 96.68mrad for Hg Jet to z-axis).
- The number of particles in a given pulse of beam (4MW, 8GeV) is $3.125*10^{15}$ s^{-1}.

Part 1: Target Geometry



Part 1: Power Deposition

8GeV & 4MW Proton beam

Shielding Material	Density (g/cm^3)	Power Dep. In SC1 (kW)	Power Dep. in Shielding material (kW)
80%WC+20%Water	12.68	24.780	1828
100%HG	13.546	33.115	1668
100%W	19.3	20.605	1903
60%W+40%HG	16.994	23.915	1768

Part 1: Power Deposition

8GeV & 4MW Proton beam

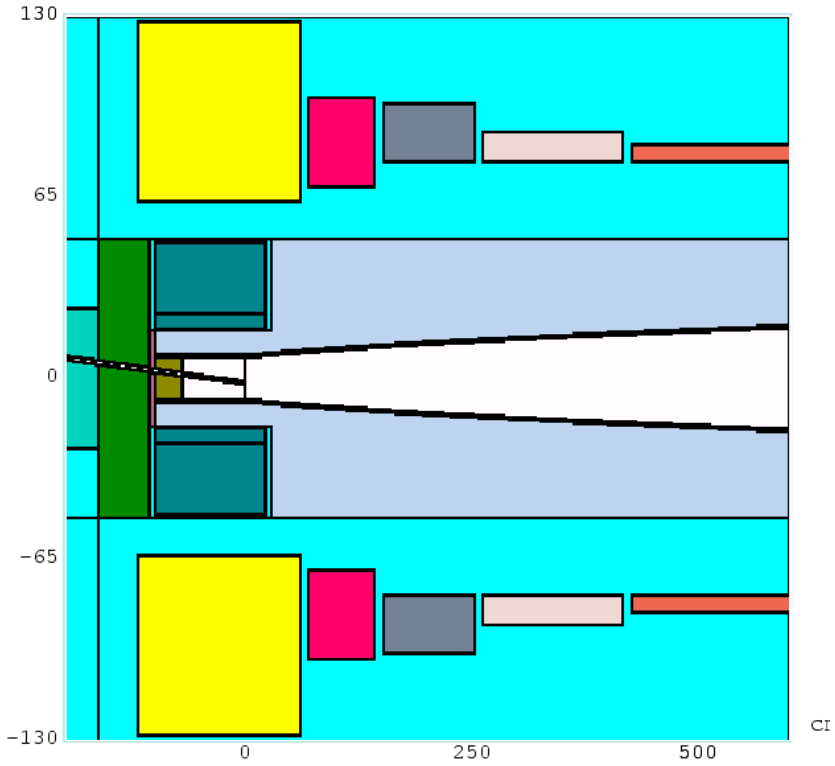
Shielding Material	Assumed Density (g/cm^3)	Power Dep. In SC1 (kW)	Power in Shielding material (kW)
TA (Z=73)	13.546	29.96	1757
W (Z=74)	13.546	28.96	1807
AU (Z=79)	13.546	32.545	1668.5
HG (Z=80)	13.546	33.115	1668
PB (Z=82)	13.546	33.805	1714
BI (Z=83)	13.546	31.35	4589 (unbelievable ?) (Increase from low energy neutrons)

Part 2: Beryllium Target

Part 2: Introduction

- Using MARS15 to study energy deposition.
- Study II geometry and magnetic field map.
- Using optimized target parameters for Beryllium Target & Proton Beam (length of 70cm on z-axis, radius of 6mm for Be target, tilt of 45 mrad for both target and beam to z-axis).
- The number of particles in a given pulse of beam (4MW, 8GeV) is $3.125*10^{15}$ s^{-1}.

Part 2: Target Geometry



Part 2: Power Deposition (PD) and Meson Production

Proton beam: 8GeV & 4MW; Shielding: 80%WC+20%Water

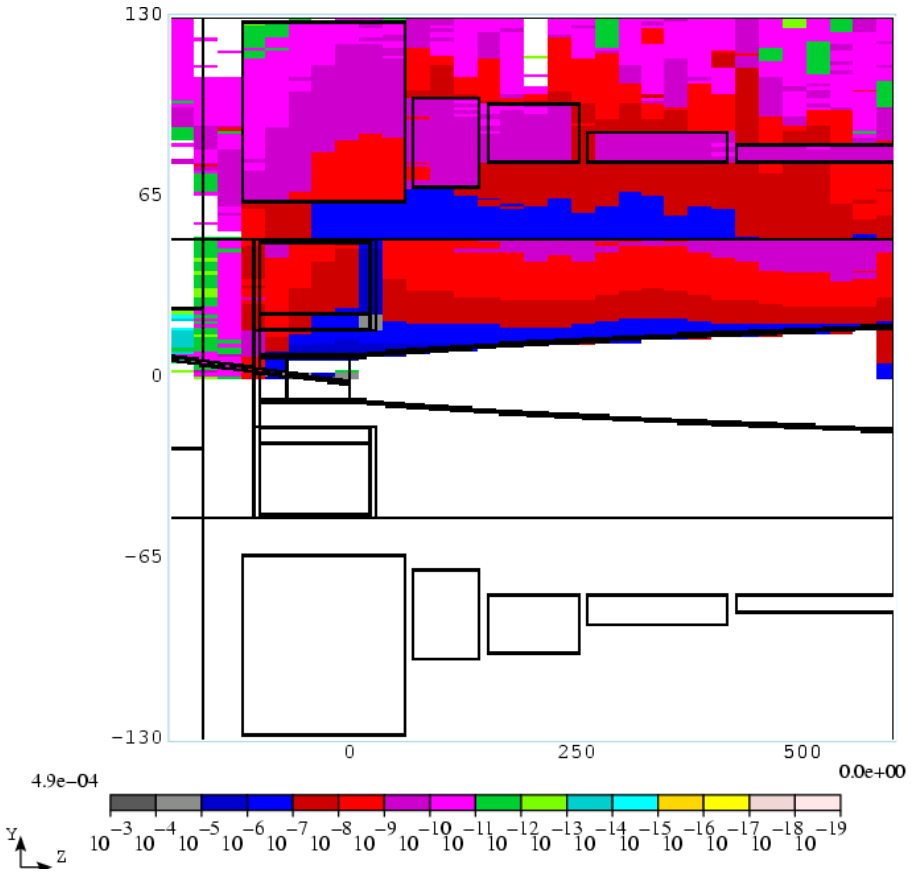
KE Cut: 40MeV<KE<180MeV

Target	PD in SC1 (kW)	PD in WC Shield (kW)
Beryllium	12.095	1888.5
Mercury	24.780	1828

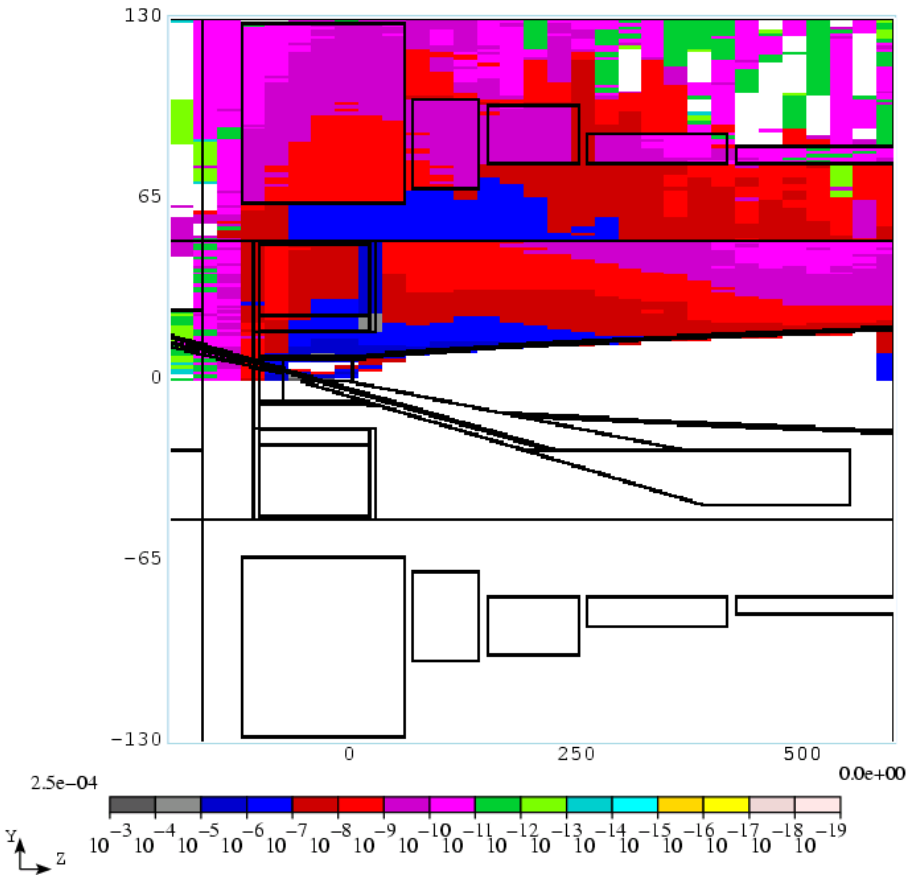
Target	Mesons	Mesons normalized to beam power (Mesons/Protons/GeV)
Beryllium	18344	0.02293
Mercury	28240	0.03530

Target	Beam power (MW)	Mesons	Scaled Beam Power (MW)	Scaled Mesons
Beryllium			6.158	28240
Mercury	4	28240		

Part 2: Distribution of Energy Deposition



Beryllium



Mercury

Part 2: Power Depositions

Proton beam: 8GeV & 4MW; Shielding: 80%WC+20%Water

Regional Name	Mercury	Beryllium	Beryllium
	Power [kW]	Power [kW]	Scaled Power [kW]
WC Shield	1828	1888.5	2907.285
Hg Pool	13.285		
Hg Jet	378.6		
Beryllium Target		145.5	223.99
Be Window	2.84	1.12	1.724
STST Bottle	416.25	687.75	1058.769
Resistive Sol	116.8	59.85	92.137
Fe Plug	11.3	7	10.77

Part 2: Energy Deposition

Proton beam: 8GeV & 4MW; Shielding: 80%WC+20%Water

Regional Name	Mercury	Beryllium	Beryllium
	Power [kW]	Power [kW]	Scaled Power [kW]
SC1	24.78	12.095	18.62
SC2	2.769	1.9575	3.014
SC3	1.0945	0.8435	1.299
SC4	0.376	0.7655	1.178
SC5	0.071	0.439	0.676
SC6	0.071	0.277	0.426
SC7	2.333	13.895	21.39
SC8	0.992	5.85	9.0
SC9	0.6075	3.7505	5.774
SC10	0.275	2.641	4.066
SC11	0.333	1.736	2.673
SC12	0.232	1.44	2.217
SC13	1.975	8.92	13.73