

Comparison of Power Deposition in SC1 Coil

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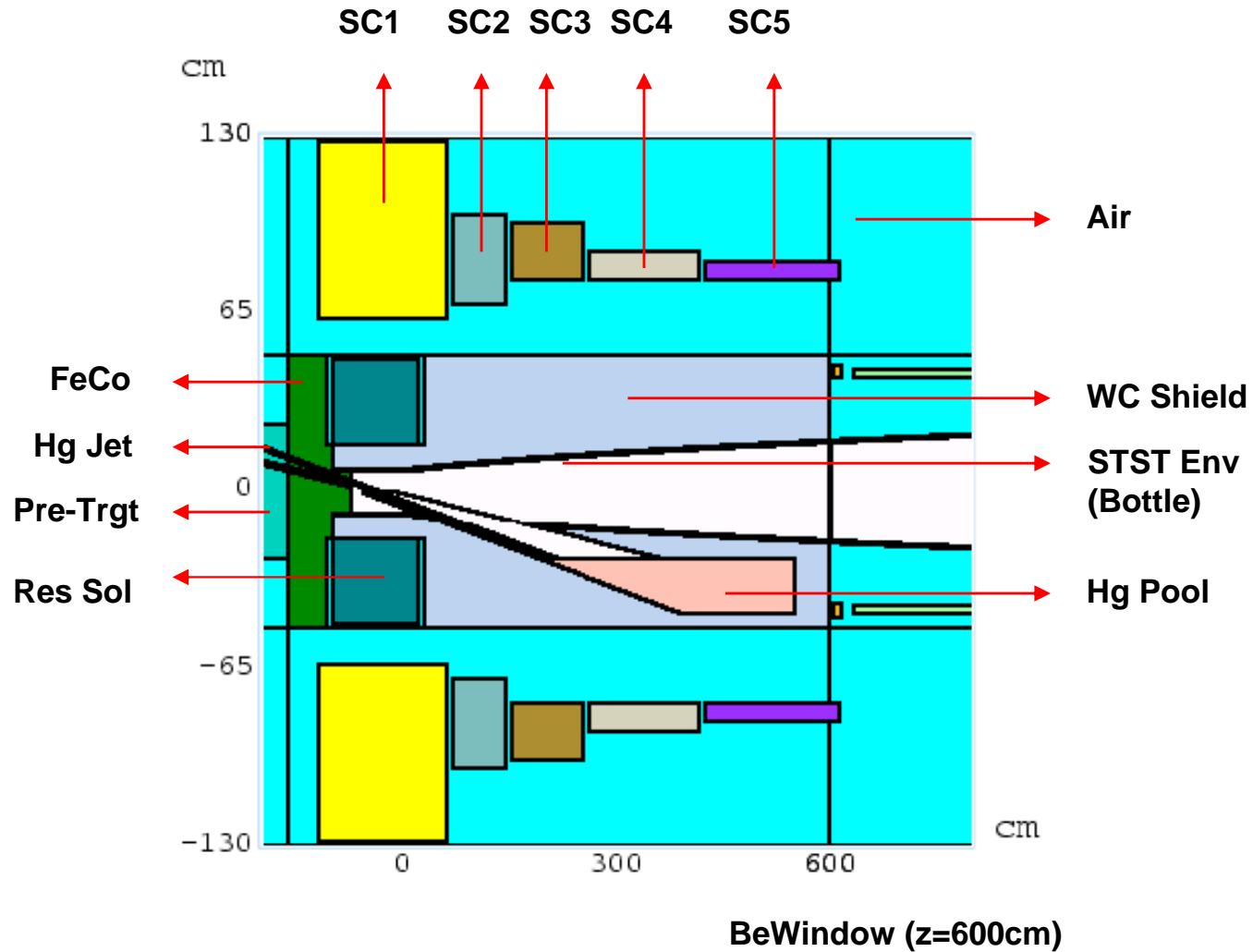
Target Studies Jun. 29, 2010

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.
- The number of particles in a given pulse of beam (4MW, 8GeV) is $3.125 \cdot 10^{15} \text{ s}^{-1}$.

Part 1: Target Geometry



Part 1: Power Deposition in SC1

8GeV & 4MW Proton beam

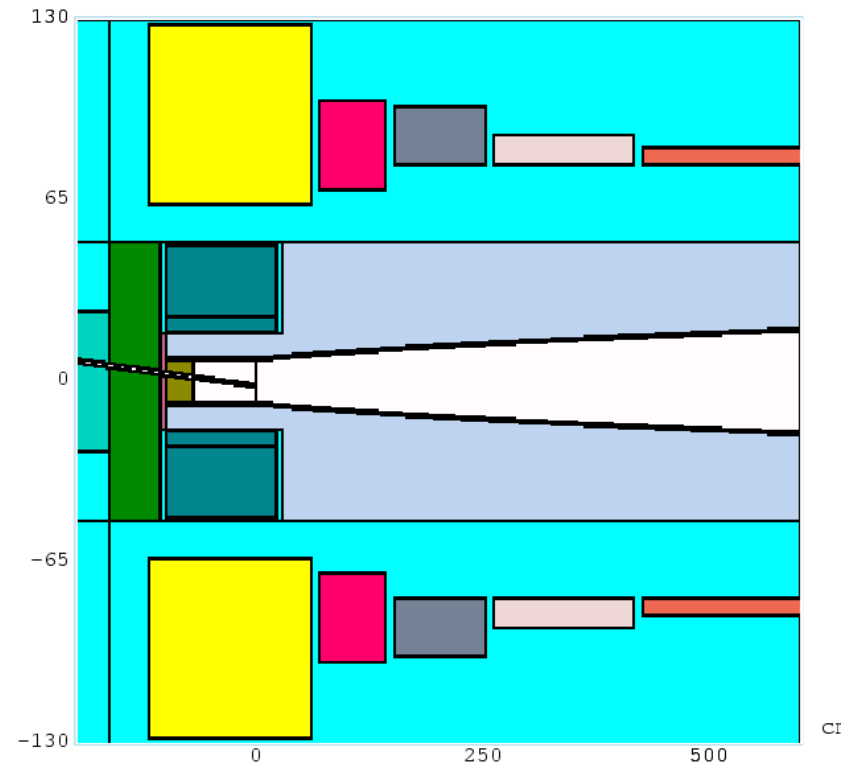
Shielding Material	Energy Dep. (GeV)	Power Dep. (kW)
80%WC+20%Water	$4.956 \cdot 10^{-2}$	24.780
100%HG	$6.623 \cdot 10^{-2}$	33.115
100%W	$4.121 \cdot 10^{-2}$	20.605
60%W+40%HG	$4.783 \cdot 10^{-2}$	23.915

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 $3.125 \times 10^{15} \text{ s}^{-1}$.

Part 2: Target Geometry

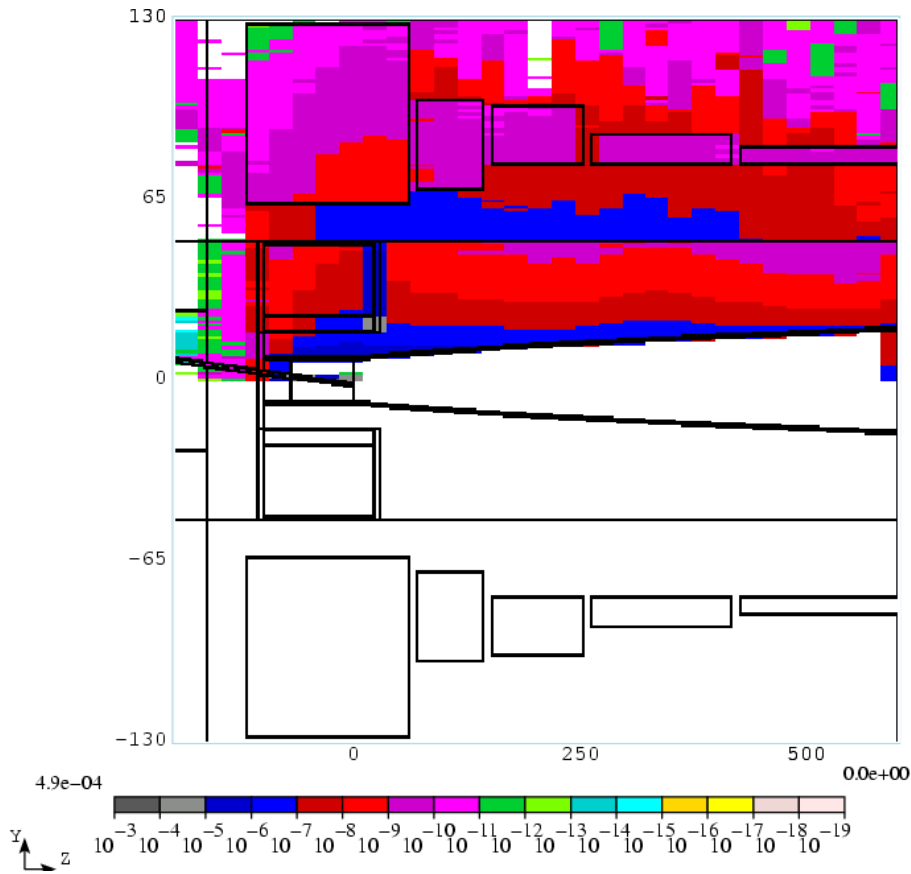


Part 2: Power Deposition in SC1

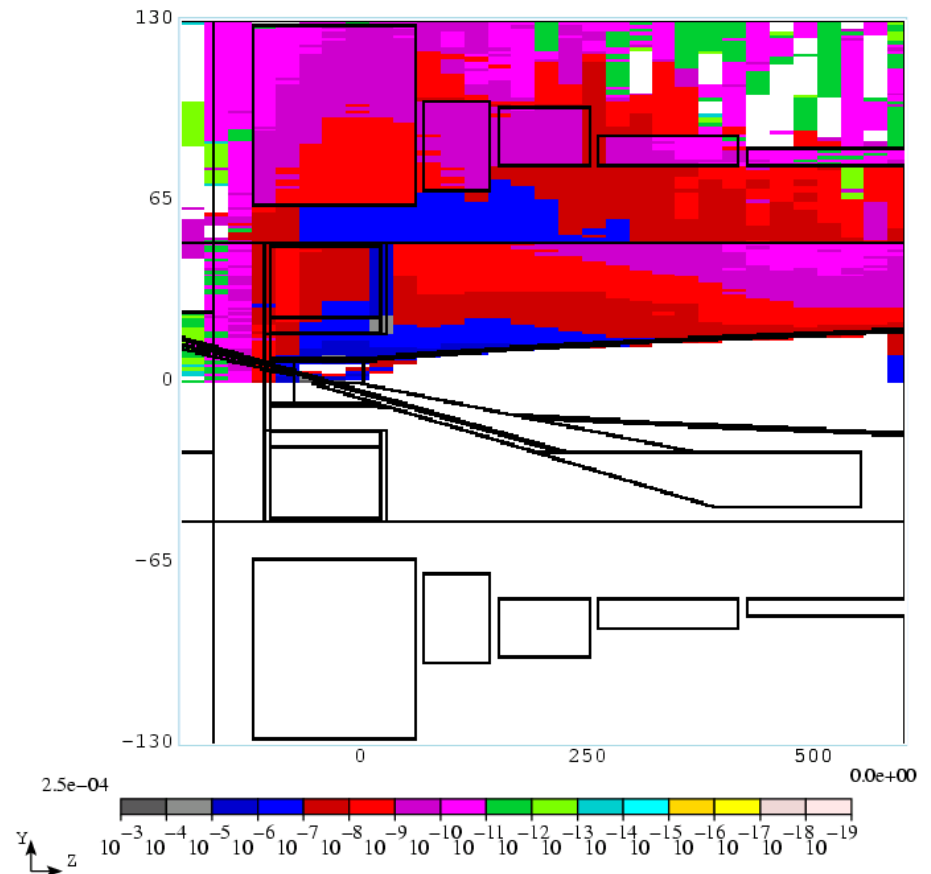
8GeV & 4MW Proton beam

Target	Energy Dep. (GeV)	Power Dep. (kW)
Beryllium	$2.419 \cdot 10^{-2}$	12.095
Mercury	$4.956 \cdot 10^{-2}$	24.780

Part 2: Distribution of Energy Deposition



Beryllium



Mercury

Part 2: Energy Deposition

8GeV & 4MW Proton beam

Regional Name	Beryllium ED [GeV]	Mercury ED [GeV]
WC Shield	3.777	3.656
Pre Trgt	$1.231 \cdot 10^{-6}$	$2.194 \cdot 10^{-6}$
Hg Pool		0.02657
Hg Jet		0.7572
Beryllium Target	0.291	
Be Window	$2.239 \cdot 10^{-3}$	$5.683 \cdot 10^{-3}$
STST Env	1.3755	0.8325
Res Sol	0.1197	0.2336
FeCo #1,#2,#3	0.014	0.0226

Part 2: Energy Deposition

8GeV & 4MW Proton beam

Regional Name	Beryllium ED [GeV]	Mercury ED [GeV]
SCSol #1	2.379×10^{-2}	4.956×10^{-2}
SCSol #2	3.915×10^{-3}	5.538×10^{-3}
SCSol #3	1.687×10^{-3}	2.189×10^{-3}
SCSol #4	1.531×10^{-3}	7.529×10^{-4}
SCSol #5	8.789×10^{-4}	1.426×10^{-4}
SCSol #6	5.538×10^{-4}	1.410×10^{-4}
SCSol #7	2.779×10^{-2}	4.665×10^{-3}
SCSol #8	1.170×10^{-2}	1.984×10^{-3}
SCSol #9	7.501×10^{-3}	1.215×10^{-3}
SCSol #10	5.282×10^{-3}	5.505×10^{-4}
SCSol #11	3.472×10^{-3}	6.656×10^{-4}
SCSol #12	2.882×10^{-3}	4.638×10^{-4}
SCSol #13	1.784×10^{-2}	3.950×10^{-3}

Part 2: Comparison of Meson Production

8GeV & 4MW Proton beam and $40\text{MeV} < KE < 180\text{MeV}$

Target	Beryllium	Mercury
Mesons (z=50m)	18656	29269