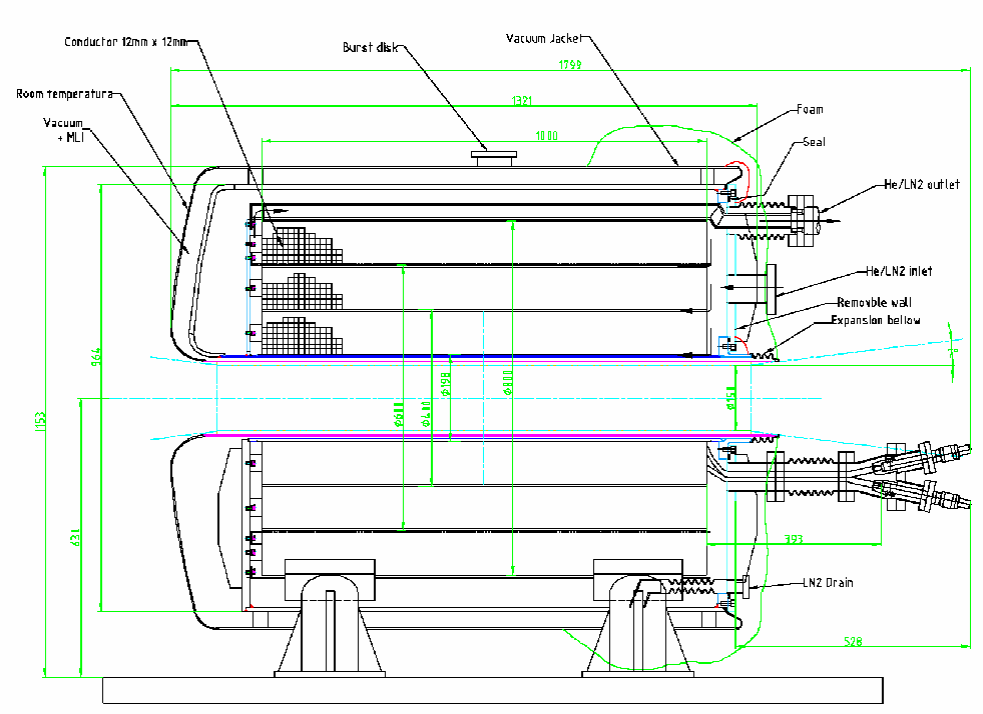
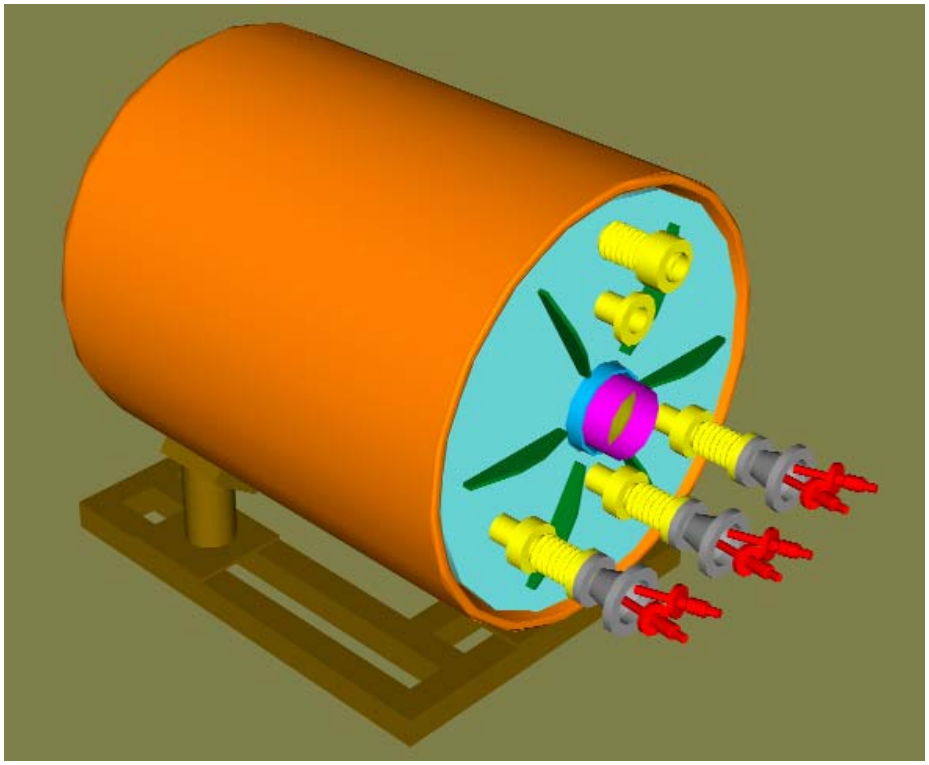
High Field Pulsed Solenoid





- 70° K Operation
- 15 T with 4.5 MW Pulsed Power
- 15 cm warm bore
- 1 m long beam pipe

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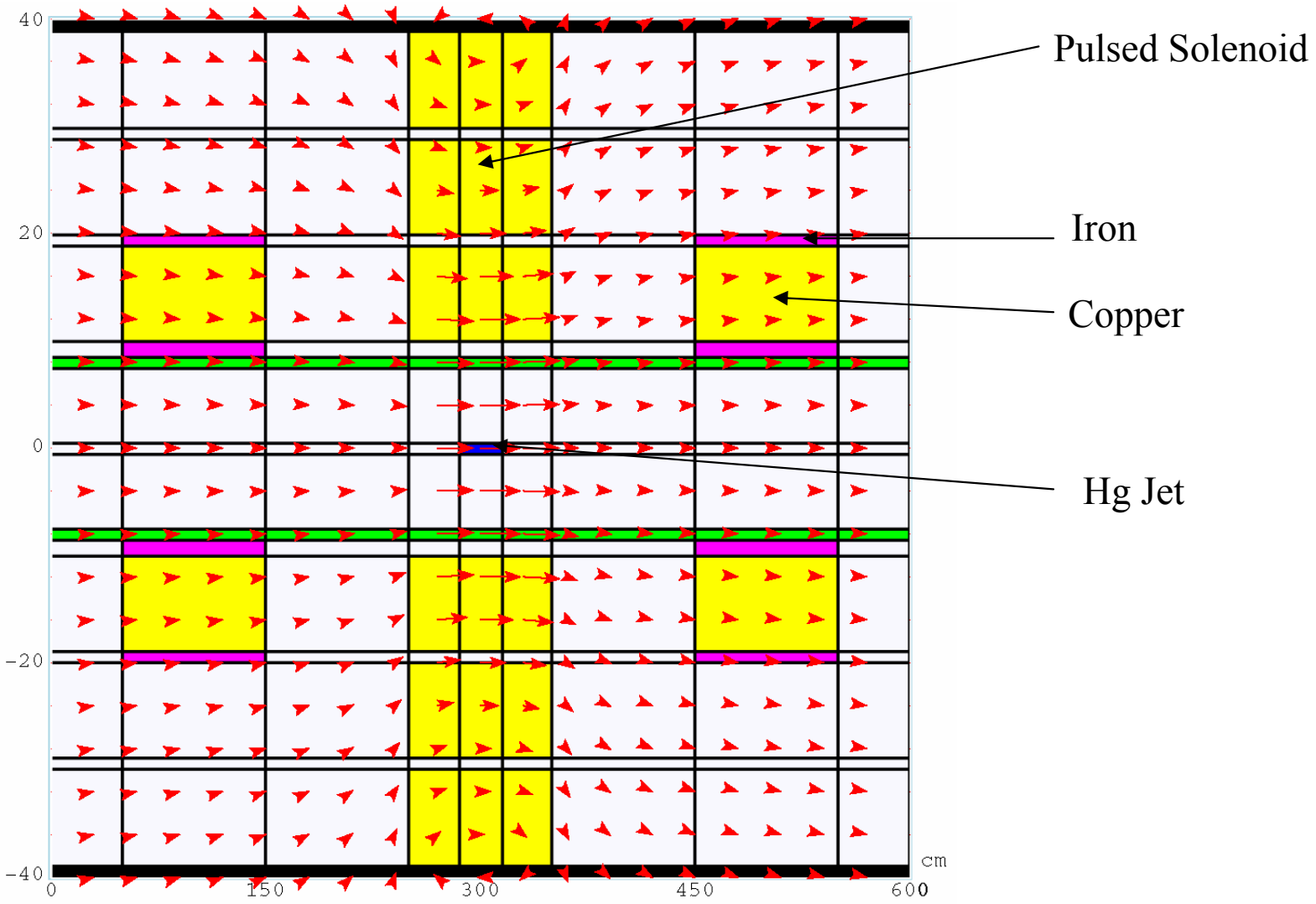
MARS Dose Calculation



Residual Contact Dose Rate

Assume:

- 200 pulses
- 16 x 10^{12} protons/pulse average
- 30 days running

Then the contact radiation on the iron exterior will be:

After 1 hr 40 mrad/hr

After 1 day 21 mrad/hr

After 1 week 13 mrad/hr

After 1 mo. 5 mrad/hr

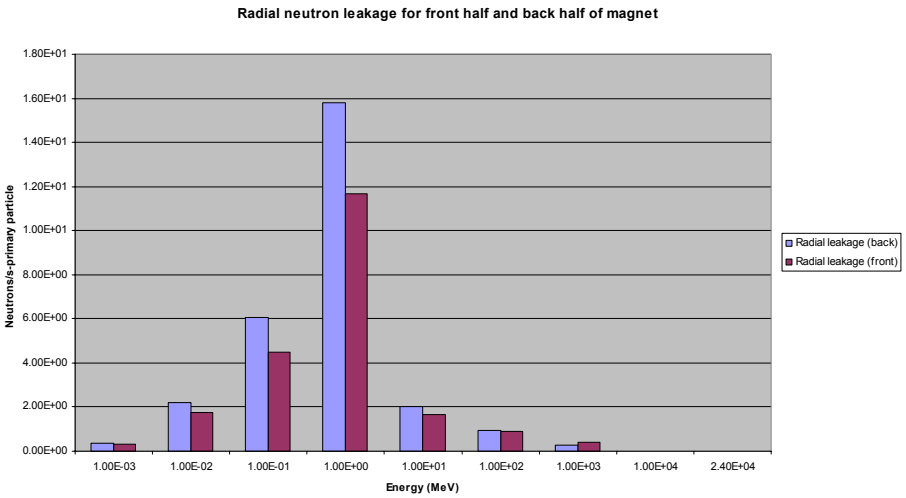
After 1 year 1 mrad/hr

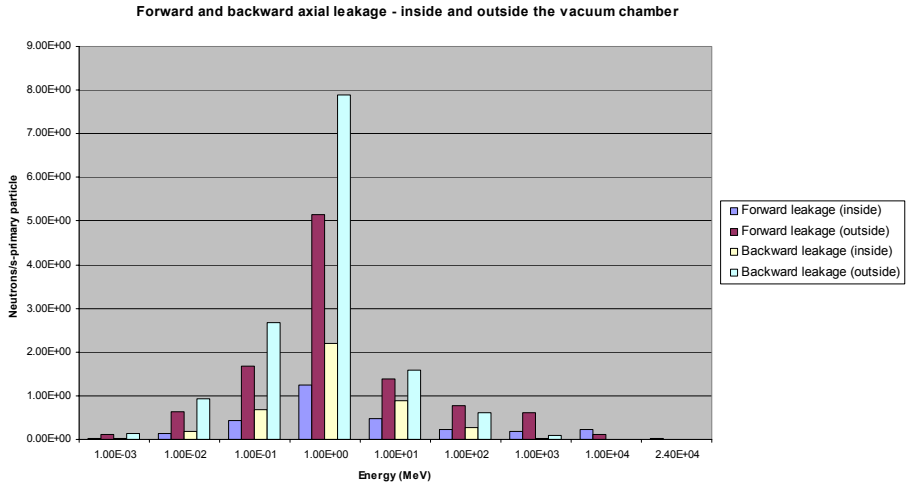
Neutron Production

Neutron flux escaping radially at r=0.6 m
Is 10^{-3} n/cm^2 for each incoming proton.

Neutron flux escaping forward is
1.2 x 10^{-3} n/cm^2 for each incoming proton.

Neutron flux escaping backwards is
1.6 x 10^{-3} n/cm^2 for each incoming proton.





Harold G. Kirk

Isotope Production on an Hg Target

Assumptions:

- 200 pulses
- 16×10^{12} protons/pulse
- 4 weeks exposure time
- 24 GeV proton beam
- 1 cm diameter – 30cm long Hg target

End of Exposure- 1 Sec delay

Elements	Curies
cs	0.22270000
pm	0.21890000
eu	0.21390000
i	0.18870000
sb	0.16260000
co	0.09249000
au	0.07887000
in	0.06314000
ir	0.05814000
al	0.05754000
rh	0.05751000
p	0.05656000
na	0.05380000
ag	0.05343000
tm	0.04840000
Total	2.5 Curies

Important contributing Isotopes
(up to 1% of activation levels)

Cs 122, 124
Pm 140,142
Eu 142, 144
I 116
Sb 112,114
Co 64
Au 202

End of Exposure- 1 Month delay

Elements	Curies
hg	0.00043070
au	0.00034510
te	0.00028140
ir	0.00027650
ag	0.00026910
in	0.00023670
sn	0.00023540
eu	0.00018110
rh	0.00018070
i	0.00014630
xe	0.00014040
gd	0.00012370
pd	0.00012230
cs	0.00012100
w	0.00011980
Total	4.3×10^{-3} Curies

Important contributing Isotopes
(up to 1% of activation levels)

Hg 203
Au 195
Te 121
Ir 188, 189
Ag 105
In 113
Sn 113
Eu 146, 147
Rh 103
I 125
Xe 127

End of Exposure- 1 Year delay

Elements	Curies
au	0.00011470
ag	0.00004882
cd	0.00004671
in	0.00004633
sn	0.00004630
ta	0.00001930
gd	0.00001678
lu	0.00001345
os	0.00001287
ce	0.00001223
rh	0.00001145
pm	0.00001097
w	0.00001089
sm	0.00001046
hf	0.00000957
Total	4.9×10^{-4} Curies

Important contributing Isotopes
(up to 1% of activation levels)

Au 195
Ag 109
Cd 109
In 113
Sn 113
Ta 179
Gd 151, 153
Lu 172, 173
Os 185
Ce 139
Pm 143
Sm 145
W 181