Muon Collaboration

Summary of Engineering Meetings

High Power Target Experiment
CERN
March 30-April 2, 2004

BROOKHAVEN NATIONAL LABORATORY

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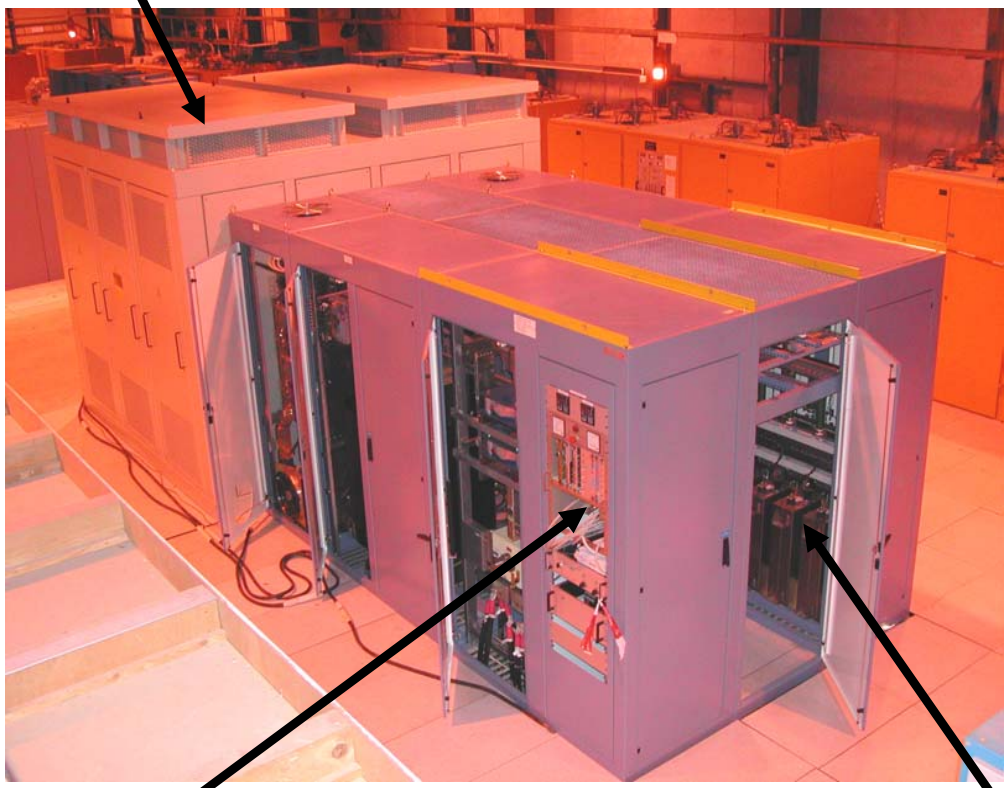
Main characteristics of power converter type ALICE/LHCb, rated 950V, 6500A

2 x Power transformers in parallel, housed in the same cubicle



Total DC output ratings:
6500Adc, 950Vdc, 6.7 MW

AC input ratings (per rectifier bridge):
2858Arms, 900Vac (at no load), 4.5 MVA

Each power transformer ratings
Primary side: 154Arms, 18kVac
Secondary side: 3080Arms, 900Vac
Nominal power: 4.8 MVA

Other
- Air forced cooling;
- Fed by two18 kV lines

High precision current control electronics

2 x rectifier bridges in parallel

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Main technical details still to be verified

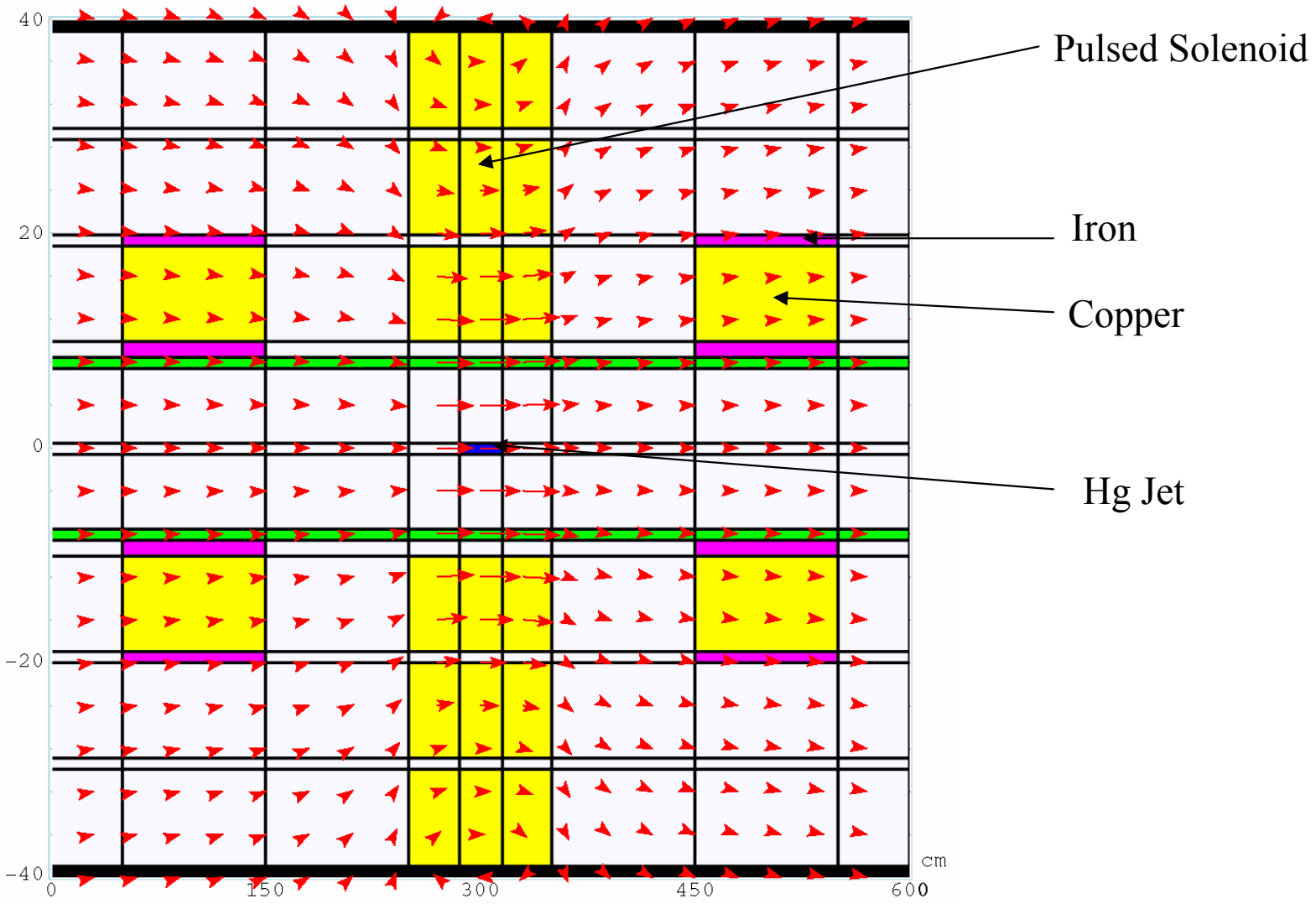
-***Best solution for connecting to a 18kV cell (CERN TS-EL group)***
- one available cell at building 269;
- one available cell at building 193 (AD);
- two used cells at building 287 (A7) – check for the possibility of joining a new one temporarily ?;
- check for other solutions, if any

-***Location of the power converter (CERN AB/PO group)***
- One solution, ***still need to be verified!!!!***

In the ISR gallery,
availability of the space?? (today used for storage of material);
the capacity of the existing crane?
- check for other solutions, if any

-***Cabling paths for the power lines (CERN TS/EL group)***

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

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	4.3×10^{-4} Curies	
Au 195	3.1×10^{-4} Curies	
Te 121	2.3×10^{-4} Curies	
Ir 188, 189	9.6×10^{-5} Curies	1.7×10^{-4} Curies
Ag 105	2.0×10^{-4} Curies	
In 113	2.3×10^{-4} Curies	
Sn 113	2.3×10^{-4} Curies	
Eu 146, 147	5.7×10^{-5} Curies	6.5×10^{-5} Curies
Rh 103	1.3×10^{-4} Curies	
I 125	1.4×10^{-4} Curies	
Xe 127	1.4×10^{-4} Curies	

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	1.1×10^{-4} Curies	
Ag 109	4.7×10^{-5} Curies	
Cd 109	4.7×10^{-5} Curies	
In 113	4.6×10^{-5} Curies	
Sn 113	4.6×10^{-5} Curies	
Ta 179	1.9×10^{-5} Curies	
Gd 151, 153	7.4×10^{-6} Curies	8.1×10^{-6} Curies
Lu 172, 173	5.3×10^{-6} Curies	8.1×10^{-6} Curies
Os 185	1.3×10^{-5} Curies	
Ce 139	1.2×10^{-5} Curies	
Pm 143	9.3×10^{-6} Curies	
Sm 145	1.0×10^{-5} Curies	
W 181	1.1×10^{-5} Curies	

Issues Remaining

- What is the beam profile on the nTOF lead target without the Hg target and without the pulsed solenoid on.
- What are the beam intensity constraints for the nTOF target. 4 x $7x10^{12}$ protons in 16 seconds is mentioned as a constraint. What if it all comes in one μs.
- What is the impact of the experiment's beam windows on the nTOF target.
- Is the isotope inventory acceptable. Thomas Otto will reply.
- A continual issue is the lack of ventilation in the nTOF tunnel. nTOF itself is threatened with shutdown beginning in 06 if the issue is not resolved.
- ODH (oxygen deficiency hazard) related to LN_2 operations must be addressed.
- Personal Radiation Plan

Experiment Site Considerations

Nufact Study 2 Beam Parameters:

- 16 TP (10^{12} Protons) per bunch 24 GeV, 1 MW Scenario
- 32 TP per bunch (x2 rep rate) 24 GeV, 4 MW Scenario

BNL capabilities

4 TP per bunch E951 experience

6 to 8 TP foreseen (with bunch merging)

No multi-bunch single turn extraction (g-2 rebuild)

CERN capabilities

5 TP per bunch normal operation

7 TP multi-bunches foreseen (for CNGS)

Multi-bunch single turn extraction available

4 bunch flexible fill of PS from booster available → Pump-Probe capability