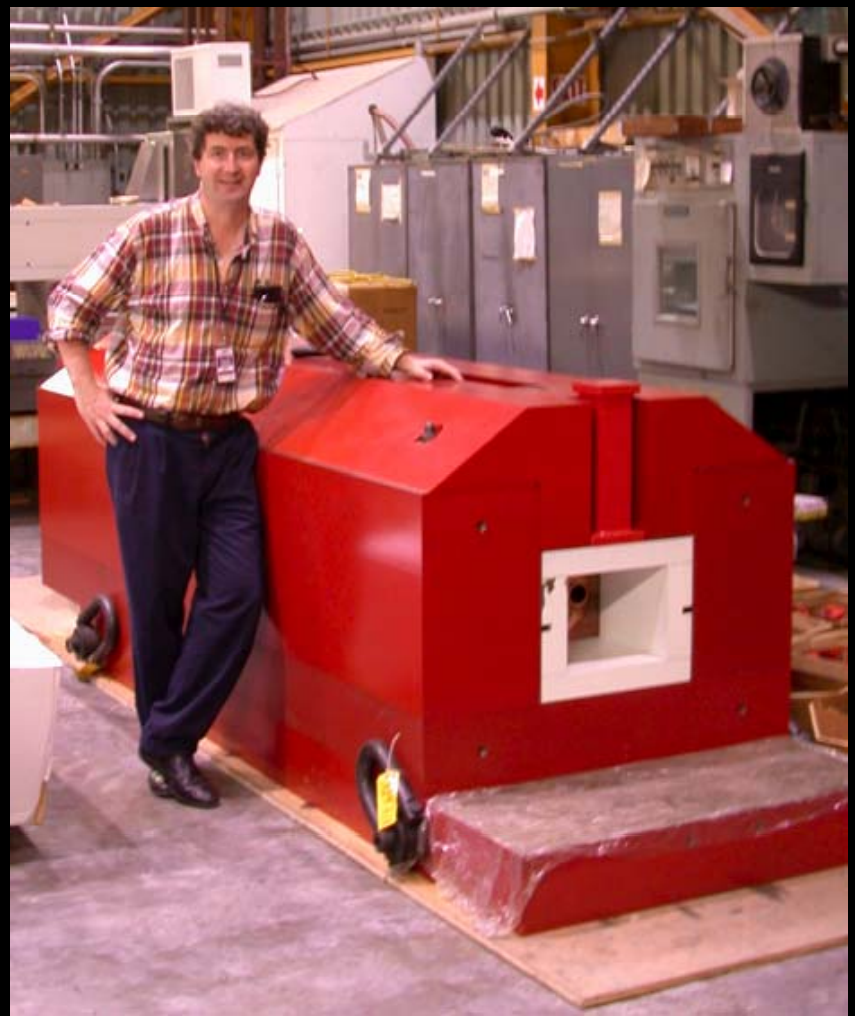
Requirements for the ZDC lift fixture

Michael Murray for ZDC group



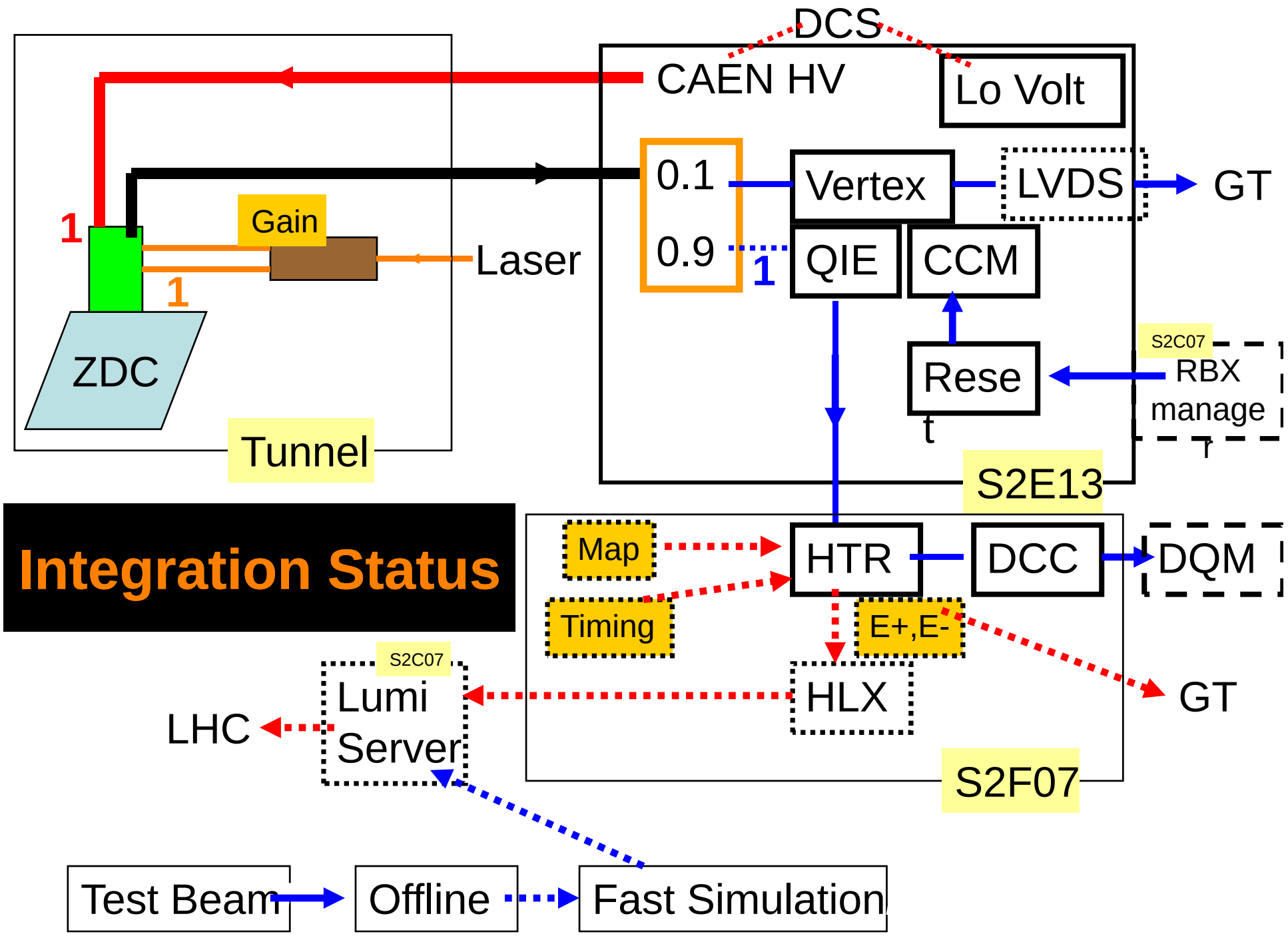
The ZDC lift fixture should allow the safe removal of the ZDC from the TAN. **Dose rates to operators should be as low as reasonably achievable.** This will allow us to maximize the physics potential of the

Why remove the ZDCs?

- The ZDC can't stay in the TAN during bakeout.
- We are not sure how long we can survive $L=10^{34}$
- We plan to stay in until the end of the first run that reaches $L=5* 10^{33}$.
- After that we will only be in for heavy ion runs and copper bars will fill the TAN slot during pp.
- The highest dose rates occur when removing

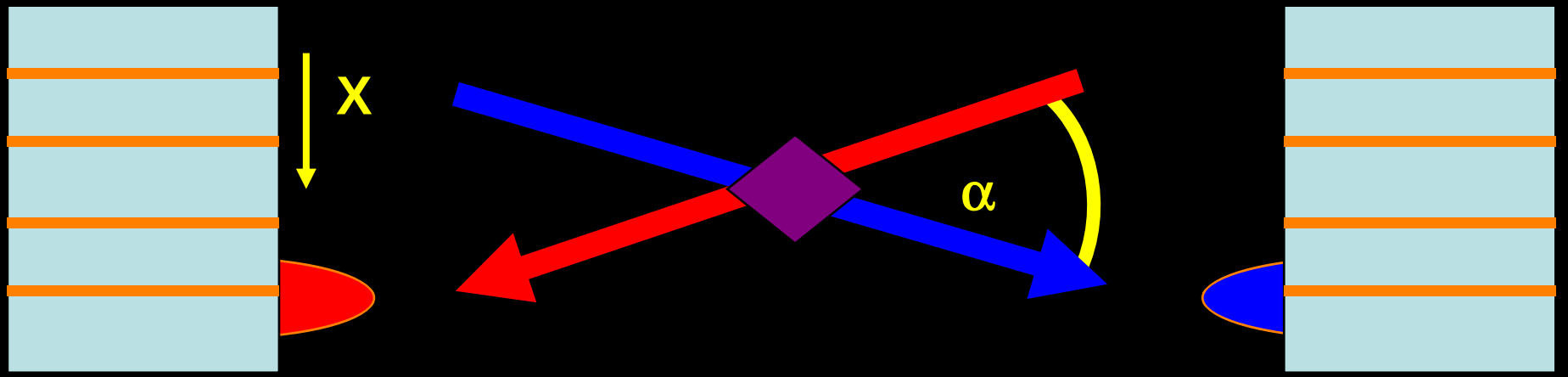
Physics as a function of time

- ’08: Luminosity, beam tuning, pp => n + X
- ’09: Lumi, soft diffraction, forward energy flow
  - 1 week heavy ions, γA, $\gamma\,\gamma$ physics, energy flow
- ’10 Lumi, hard diffraction
  - 1 month ions, systematics of physics vs size and shape of collision region
- ’11 we may not be in for pp
  - 1 month Heavy ions with high mass probes


DCS
CAEN HV
Lo Volt
0.1
0.9
Vertex
LVDS
GT
1
Gain
Laser
1
1
QIE
CCM
ZDC
Rese
t
S2C07
RBX
manage
r
Tunnel
S2E13
Integration Status
Map
HTR
DCC
DQM
Timing
E+,E-
S2C07
Lumi
Server
LHC
HLX
GT
S2F07
Test Beam
Offline
Fast Simulation

Luminosity Monitoring with the ZDC

Electromagnetic part sees pp bremstralung with E>20GeV



1. Luminosity is proportional to rate of coincidence
2. Crossing angle $\tan(\alpha)=(X_{left} - X_{right})/240m$
3. Average $X = X_{left} + X_{right}$
4. Z of interaction = $c^* (T_{left} - T_{right})$

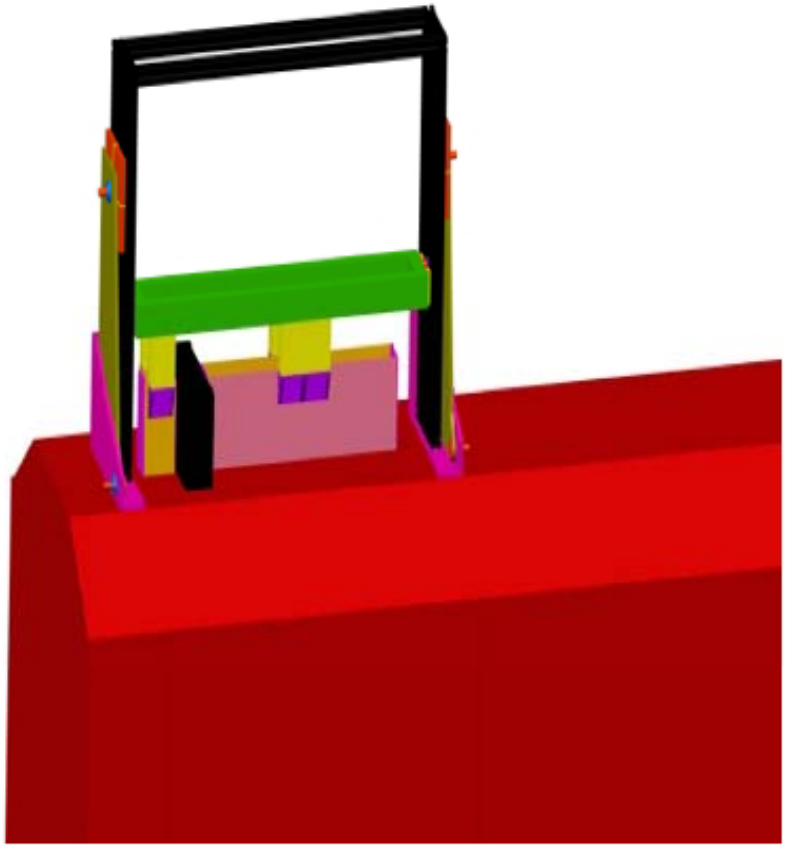
Some “Issues” facing lift fixture

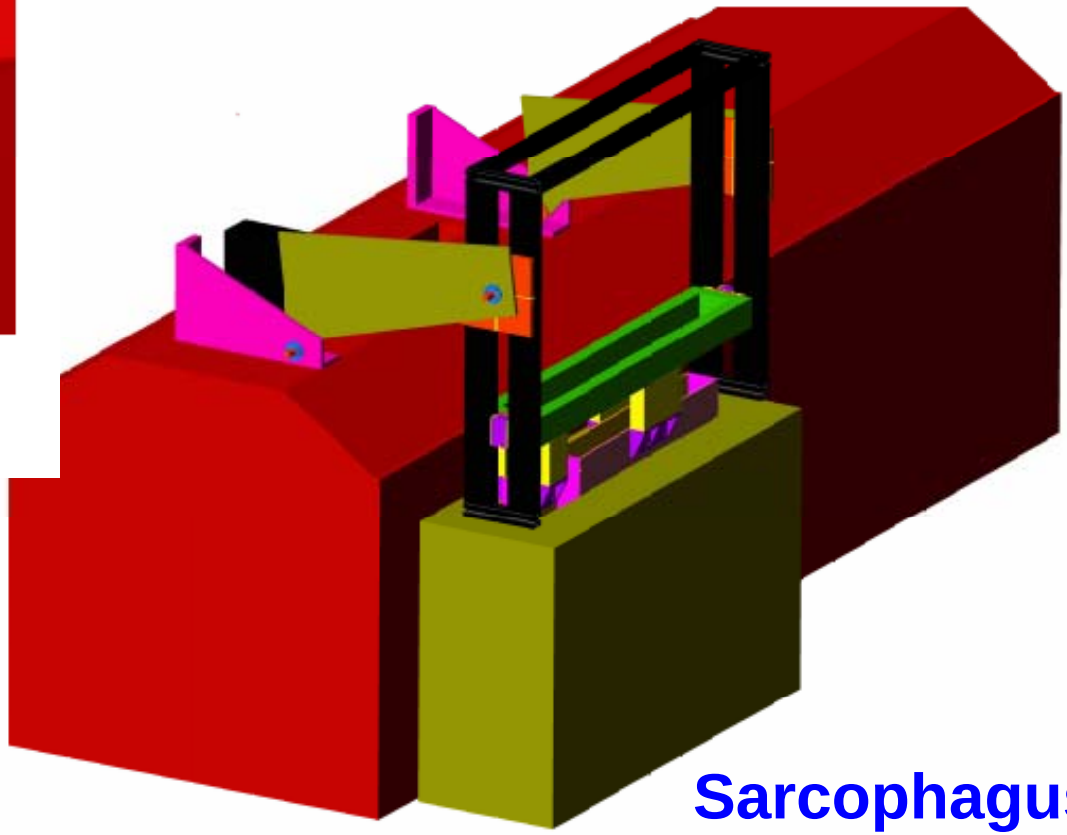
- TAN and ZDC are not perfectly smooth
- LHC tunnel slopes downward
- BRAN readout takes up a lot of vertical space.

Paul is familiar with all of these

Crane Concept

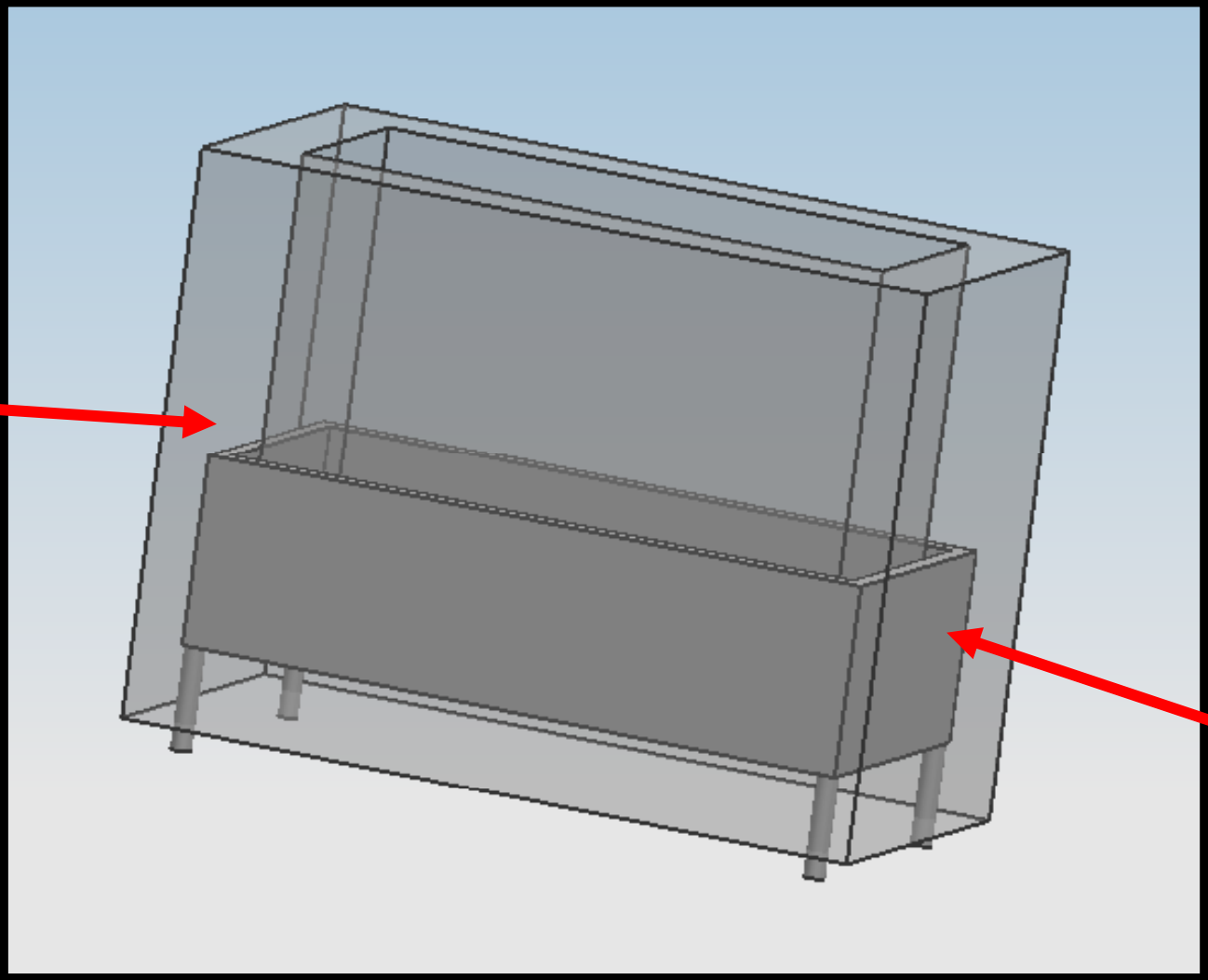
Paul Debbins, Iowa





Sarcophagus

Sarchophagus



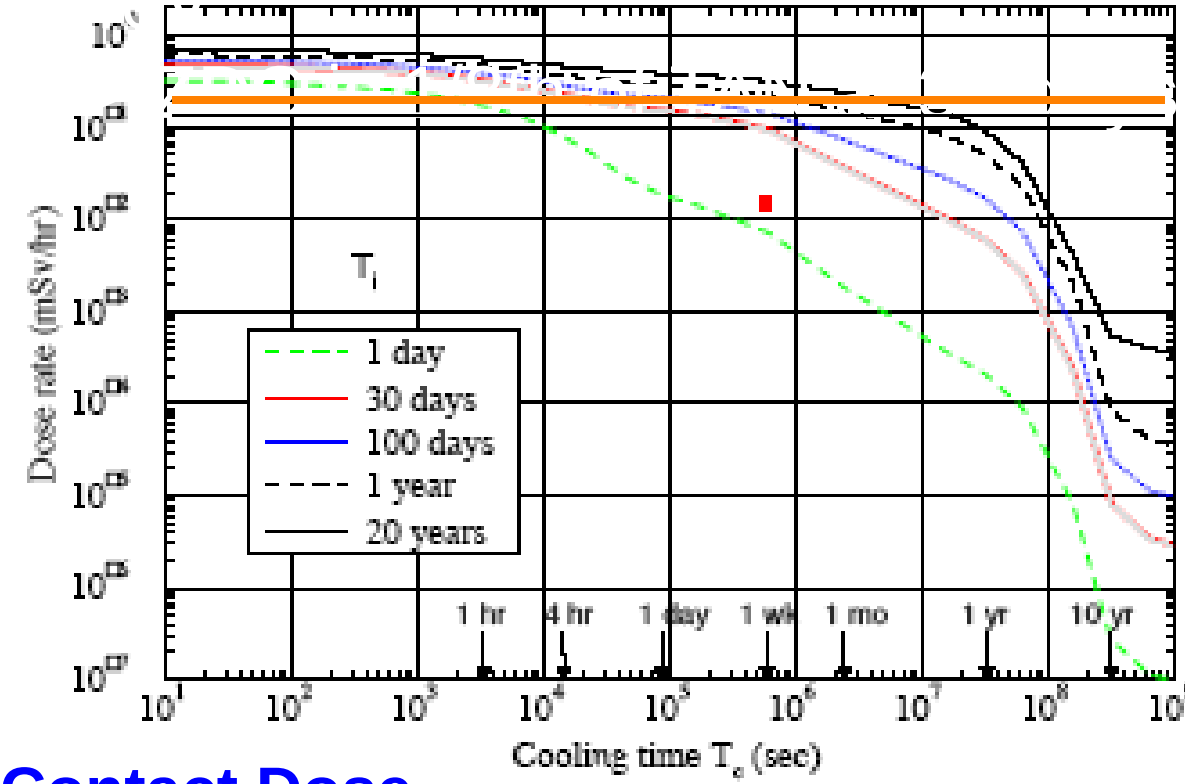
Mass < 1000Kg, allows factor 30 reduction in γ flu

Activation after 40pb

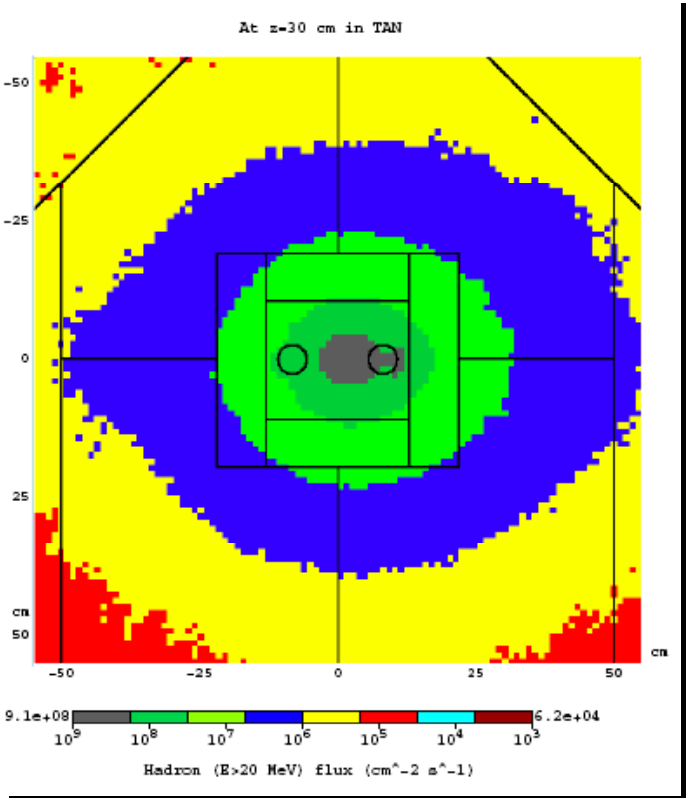
40pb = 4000s at 10^{34}, $1.5*10^{-3}$ months

ZDC = 3000 hotter than TAN edge

Tungsten, 10TeV = 1.4*Copper



Contact Dose



My estimate 15μSr/hr

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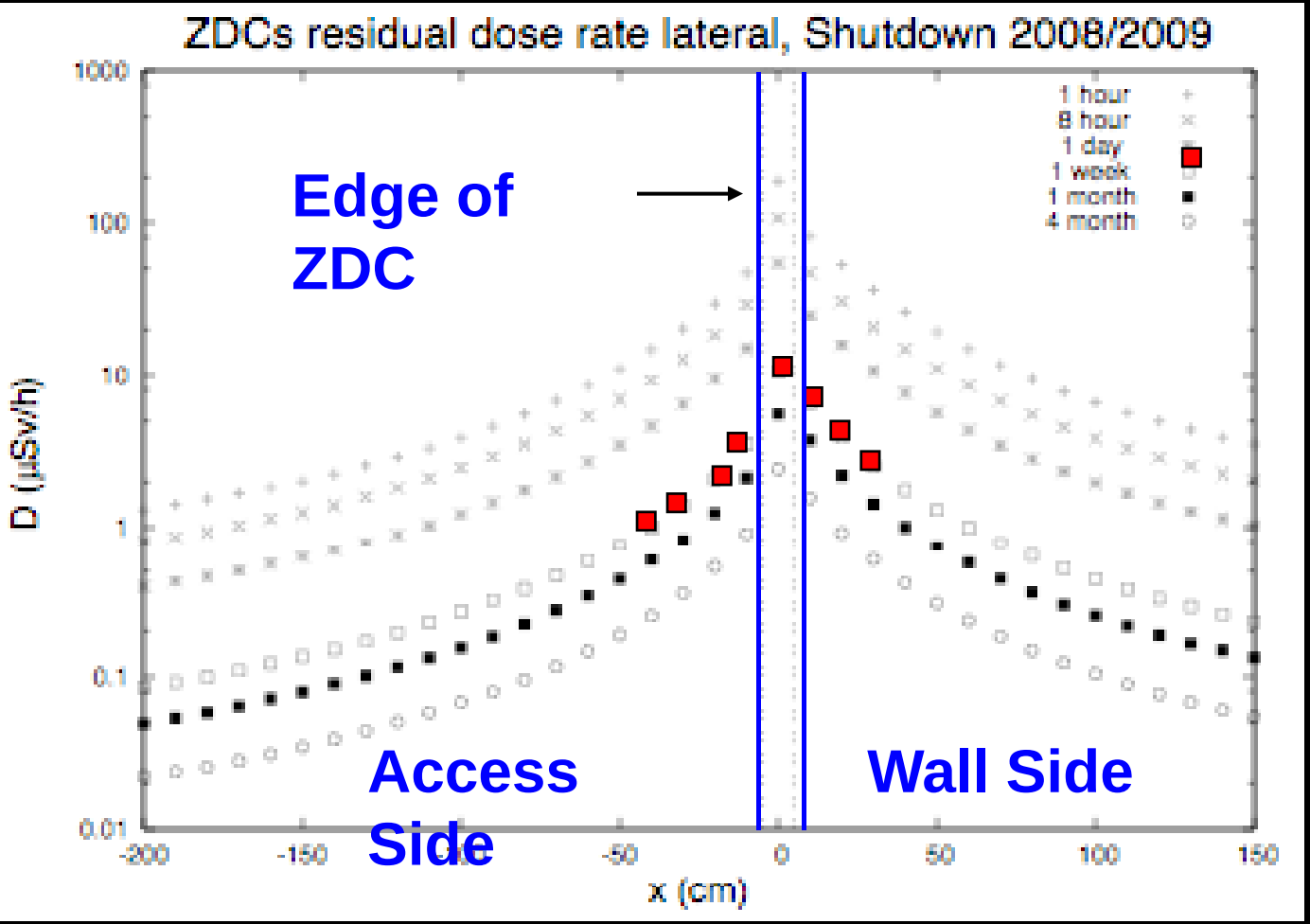
FERMILAB-FN-732 April 03

Markus's calculations with real geometry etc

Contact dose versus horizontal position for right ZDC



Markus 3μSr/hr
Michael 15 μSr/hr
We'll work on reconciling these.

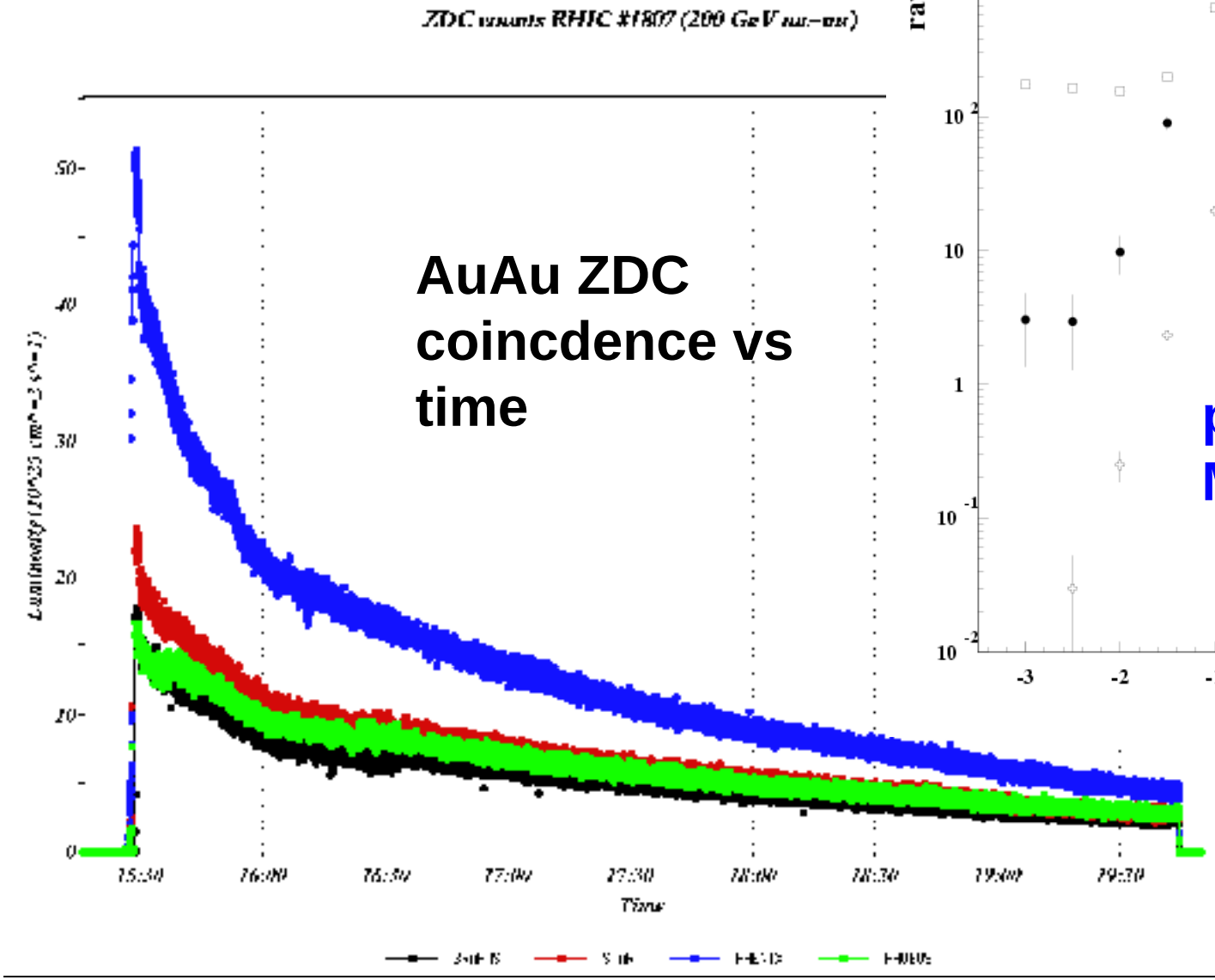
Will calculate dose's for work plan to remove ZDC this winter

Conclusions

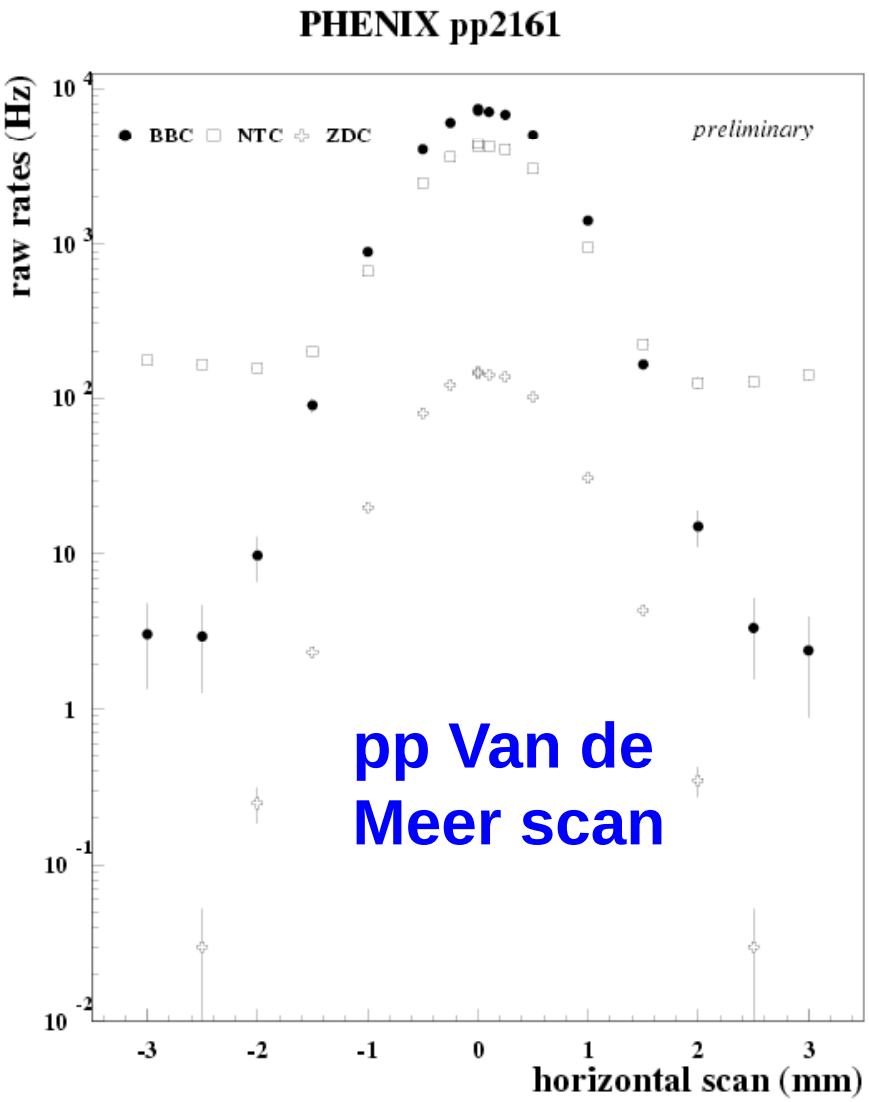
- Safely removing the ZDC is certainly a technical challenge
- Dose rate can be simulated
- We have learned quite a lot from experience with current system
- Paul will now present his plan for solving this challenge

Backups

Luminosity & beam tuning at RHIC

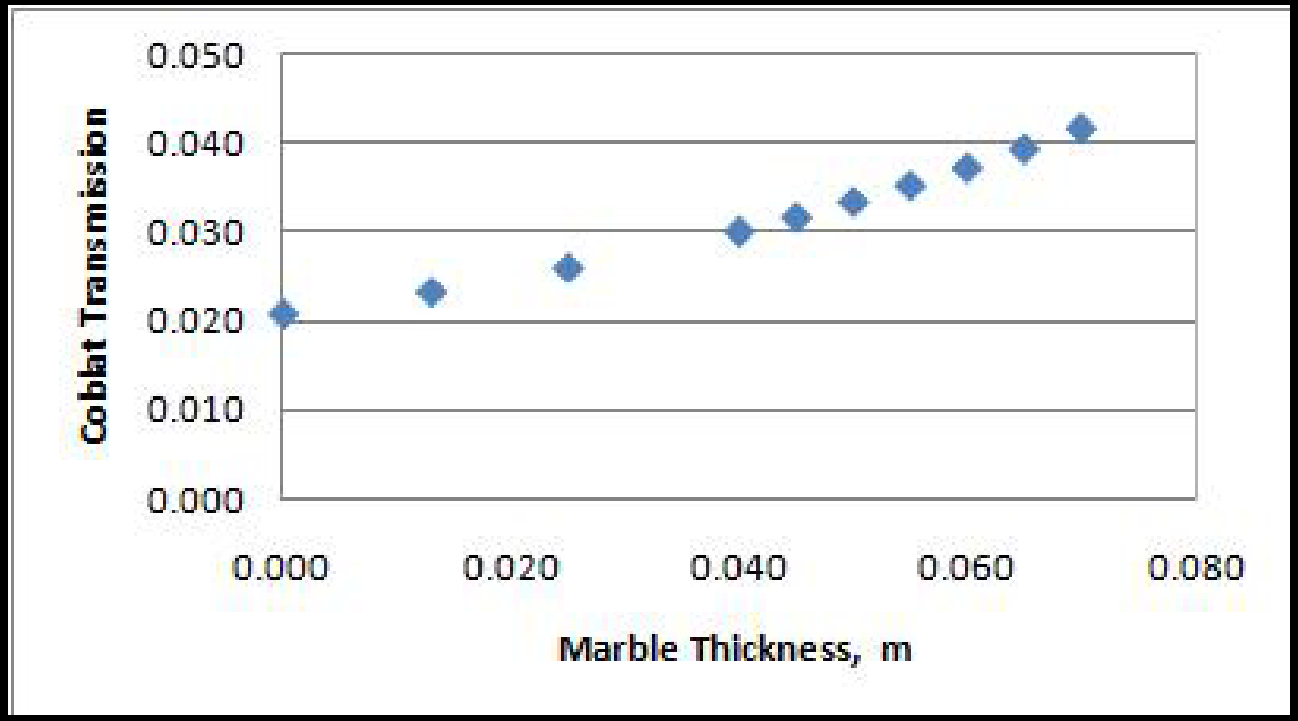


AuAu ZDC coincdence vs time



pp Van de Meer scan

Sarcophagus shielding



Given a certain thickness of marble and mass constraint we can only put in so much lead.