

Issues of electronic systems in the radiation field of the XFEL

Report for the Summer Student Program 2006
at DESY Hamburg

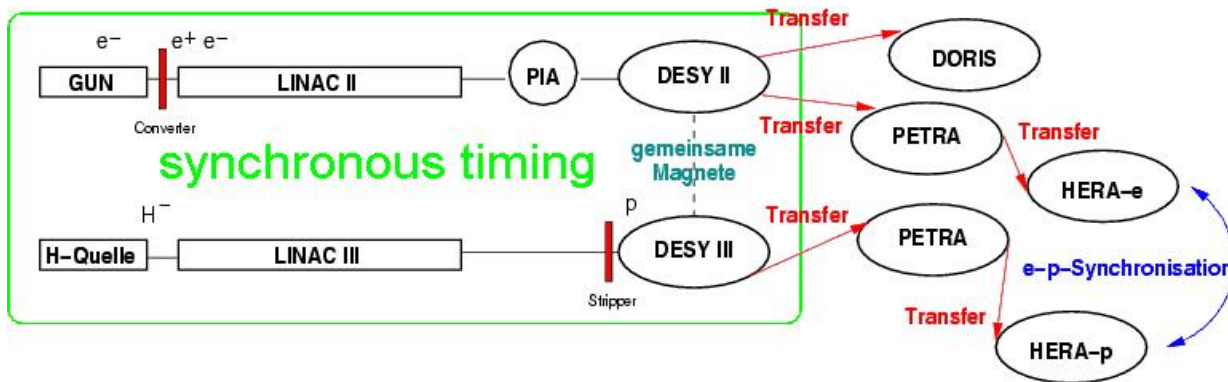
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MSK group DESY

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Matthias Hoffmann, Karol Suchecki, Waldemar Koprek

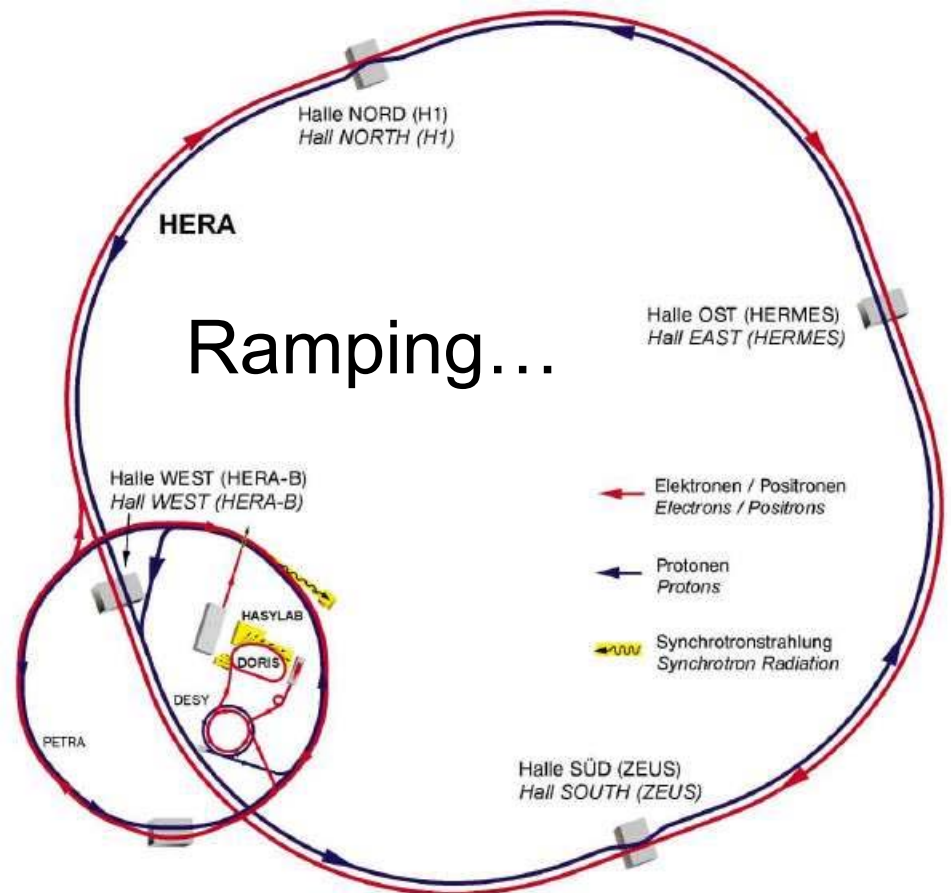
What is MSK ?

Beam control of all machines
(MSK: Maschinen Strahl Kontrolle)

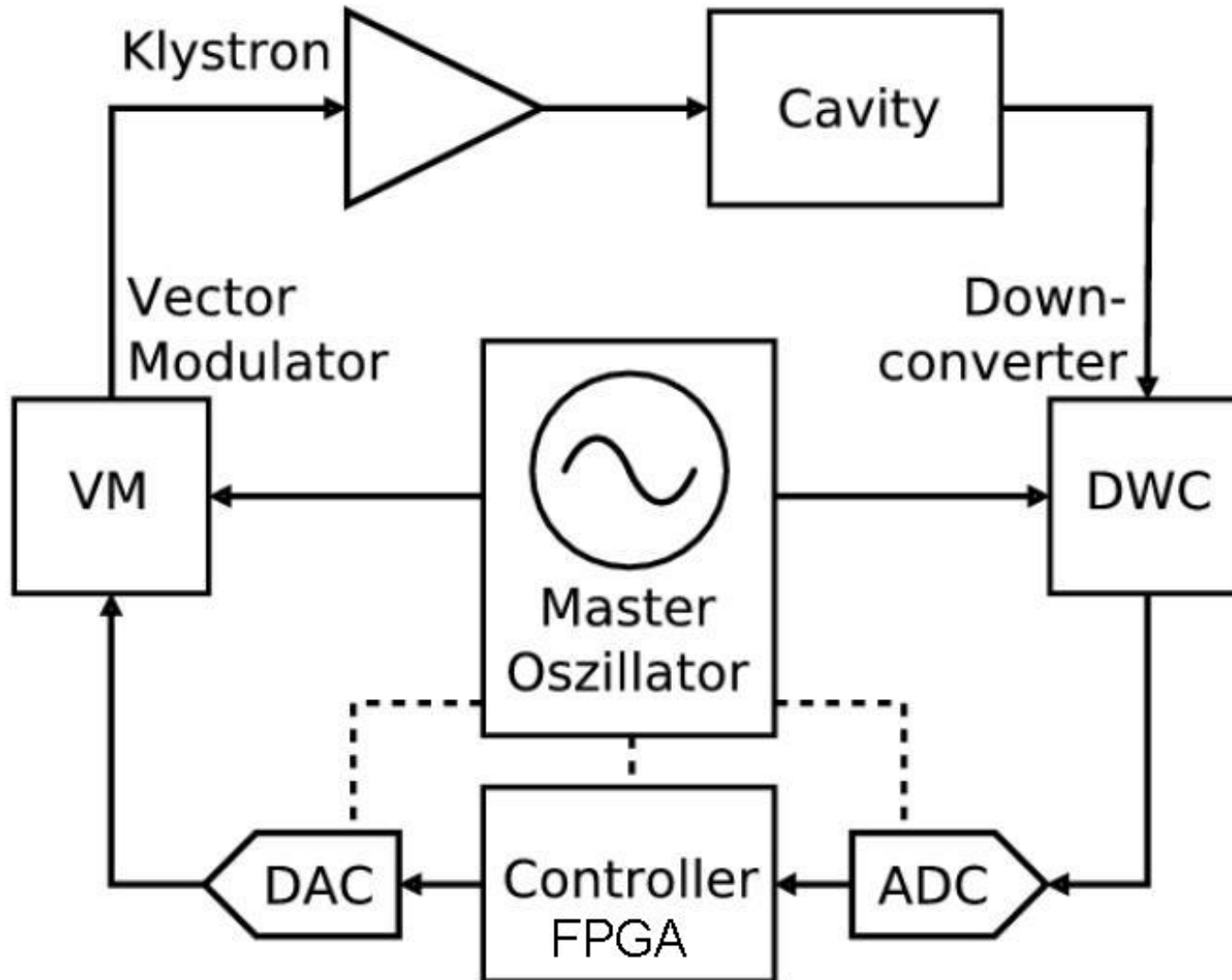
- **Timing** (Transfer of bunches)
- **LLRF control** (M.O. generates highly stable signals)
- **Feedback** (correction signals for field stability [XFEL])
- **Magnet power** (e.g. acceleration ramps)



Timing...



The Feedback loop



TLD Readout station



Radiochromic foils



unirradiated irradiated

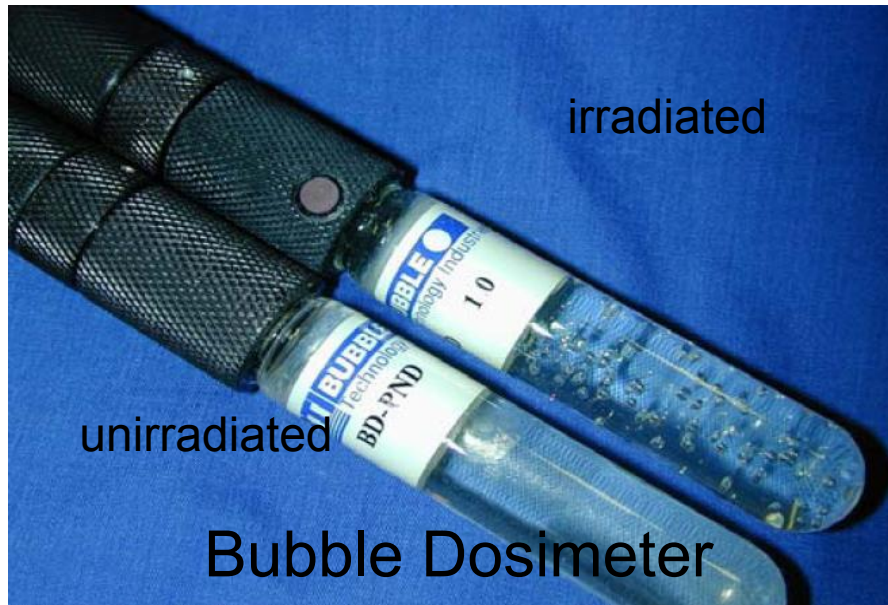
Gamma dose 5-10 Gy

Dosimetry

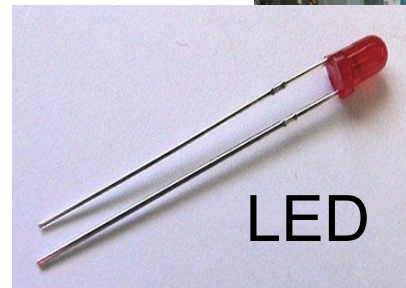
irradiated

unirradiated

Bubble Dosimeter

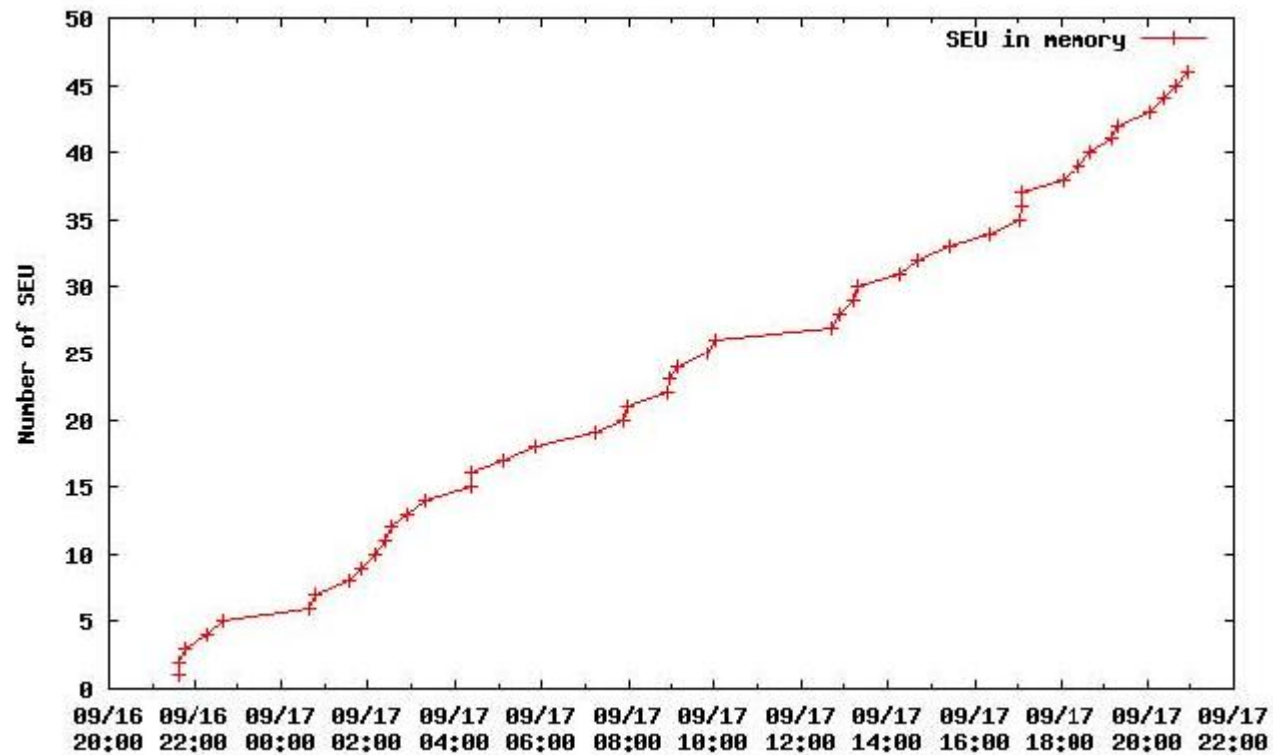


LED



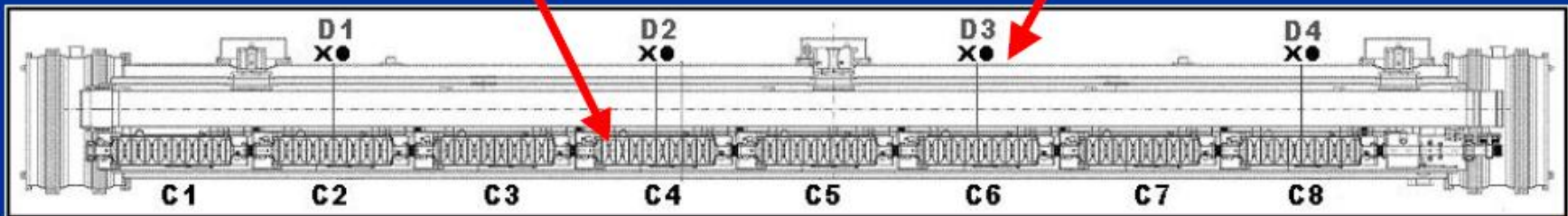
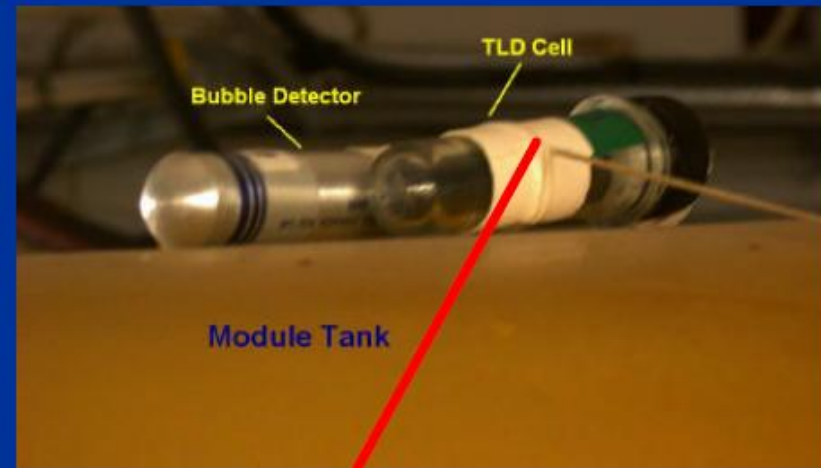
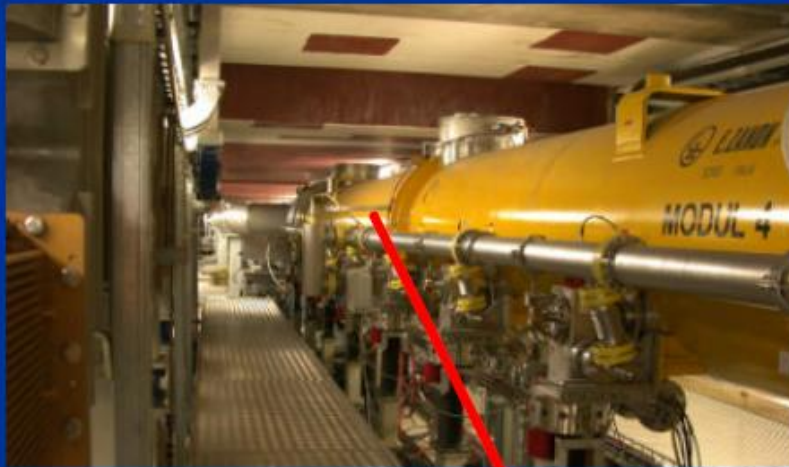
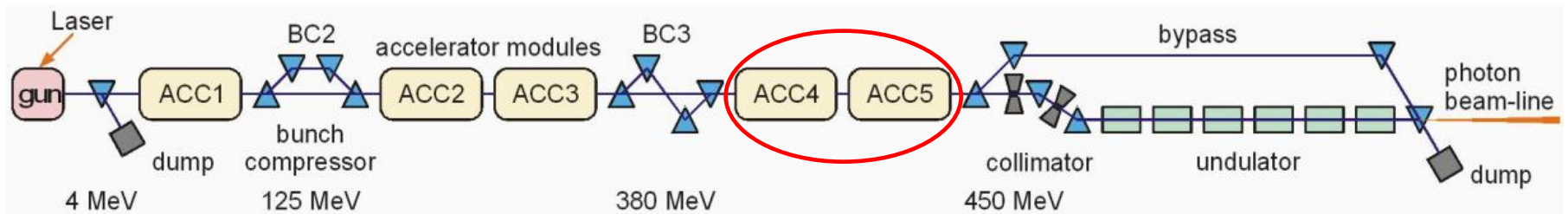
a RADMON demonstration...

<http://neo.dmcs.p.lodz.pl:9998>



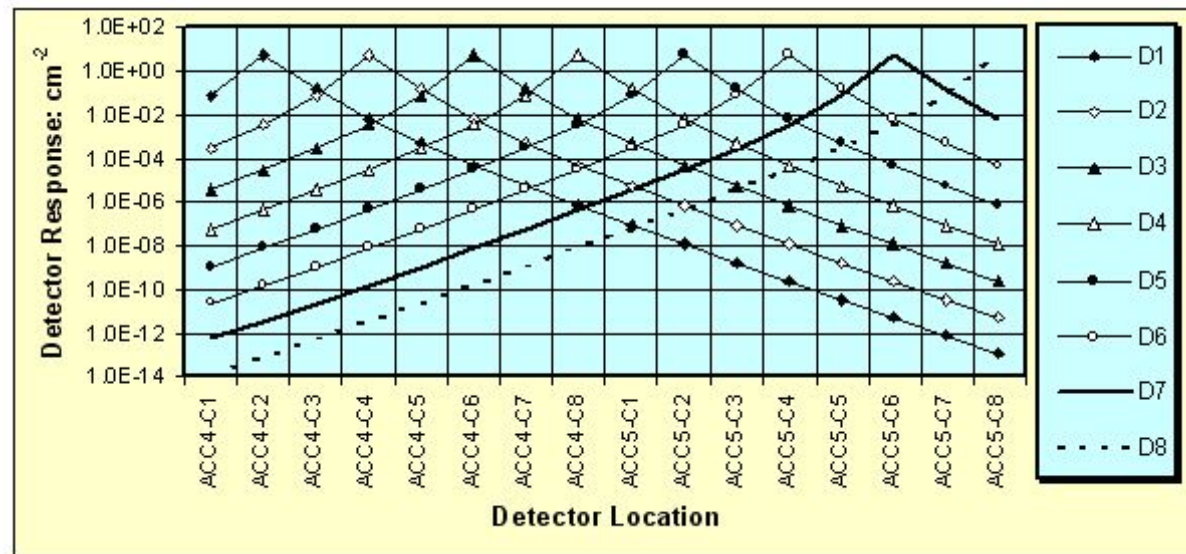
one SEU corresponds to $\approx 3.9 \cdot 10^4$ neutrons / cm²

FLASH / TTF2

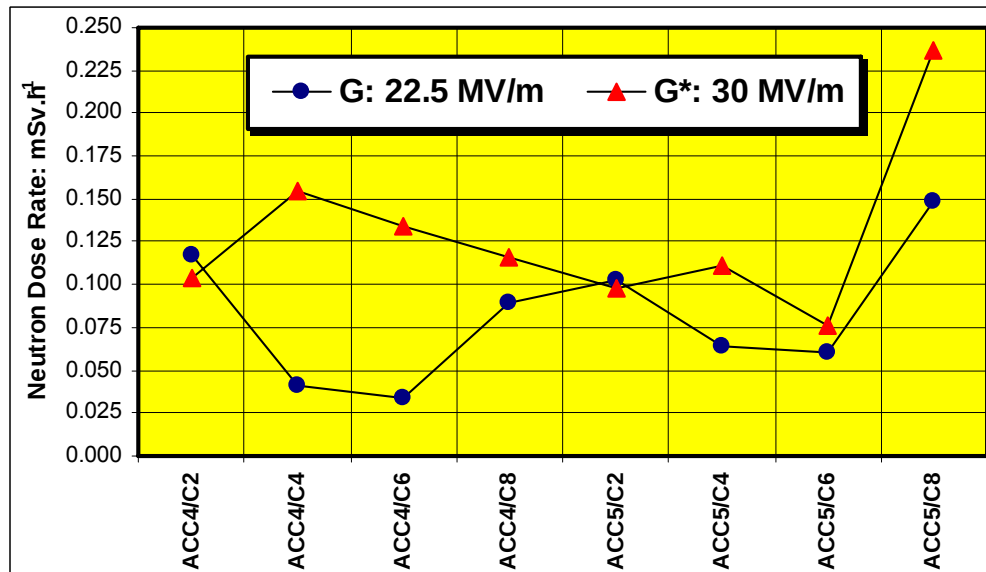
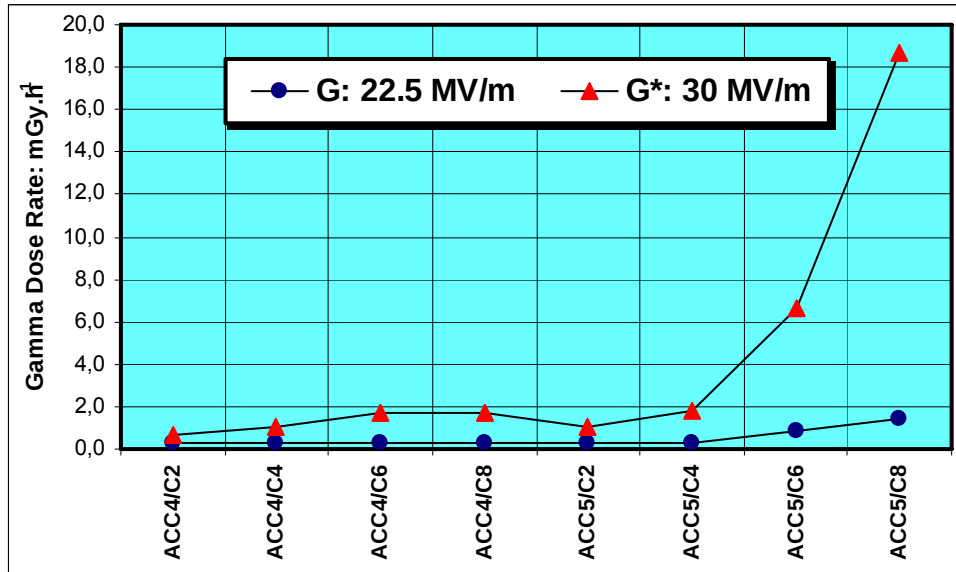


Unfolding the data via the response matrix

$$\begin{bmatrix} \Phi_1 \\ \vdots \\ \Phi_m \end{bmatrix} = \begin{bmatrix} A_{1,1} & \dots & A_{1,n} \\ \vdots & \ddots & \vdots \\ A_{m,1} & \dots & A_{m,n} \end{bmatrix} \cdot \begin{bmatrix} \Psi_1 \\ \vdots \\ \Psi_n \end{bmatrix}$$



Results



- We have explicitly measured the gamma and neutron dose rates near the ACC 4 and ACC 5 modules.
- The gamma dose rates were found to be 2 orders of magnitude higher than the neutron dose rates.
- Both gamma and neutron dose rates rise exponentially with the increment of the module gradient.

Thank You !

Timing...

