

# Focussing Disc DIRC – Status Report

**Matthias Hoek**

**NPE**

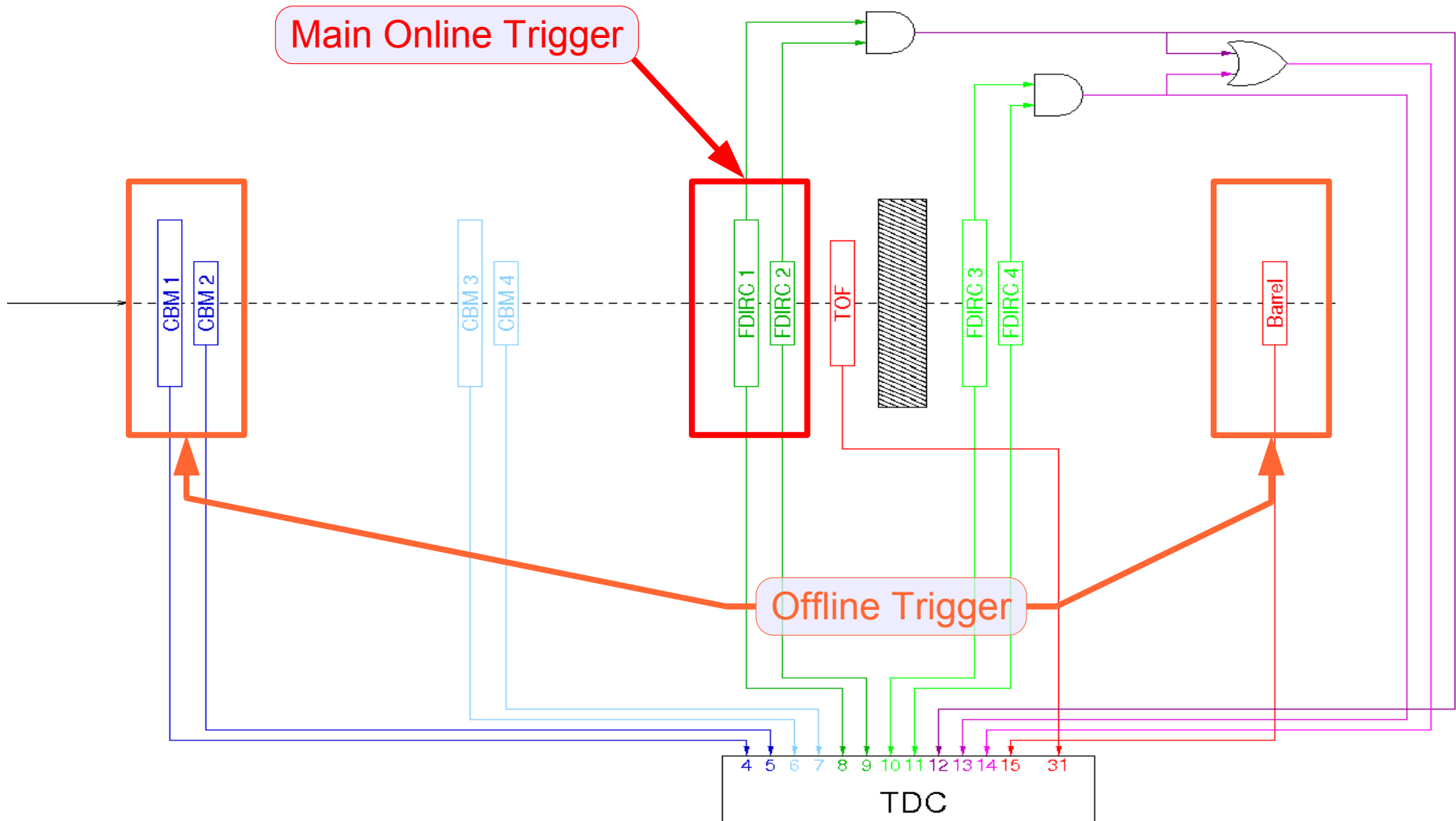
**University of Glasgow**



## 1<sup>st</sup> Test Experiment at GSI - Analysis

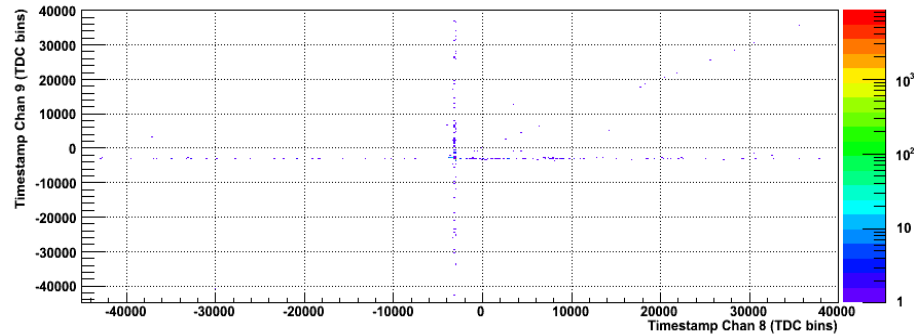
- ▶ Data Sets
  - ▶ Angles covered from  $-10$  to  $25^\circ$ 
    - ▶ Two impact positions:  $\sim 17\text{cm}$  and  $\sim 37\text{cm}$  from PMT
  - ▶ Linear scan
  - ▶ Thanks to Giessen Group for their stepper motors
- ▶ Data Selection
  - ▶ Data Quality
  - ▶ Offline Trigger Pattern
  - ▶ TDC Correlations
- ▶ Simulation
  - ▶ LITRANI with all relevant optical parameters  
(Dispersion, Absorption, QE etc.)

## 1<sup>st</sup> Test Experiment at GSI – Trigger Scheme

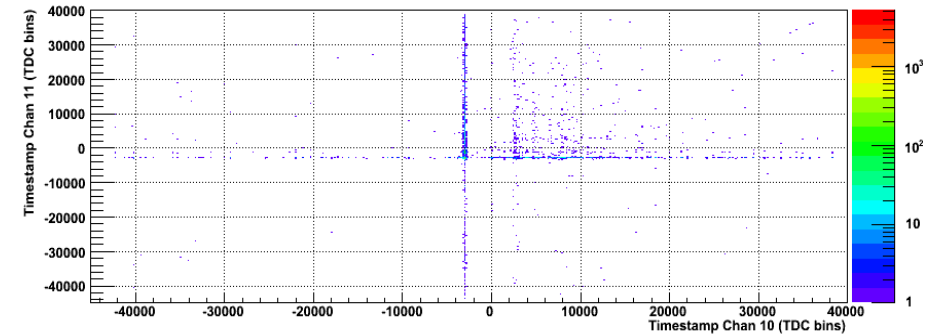


# 1<sup>st</sup> Test Experiment at GSI – Primary Trigger System

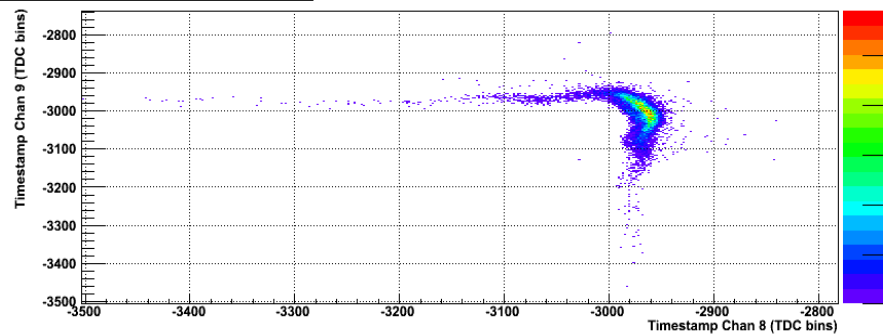
hTdcCorrelation\_Chan8\_Chan9



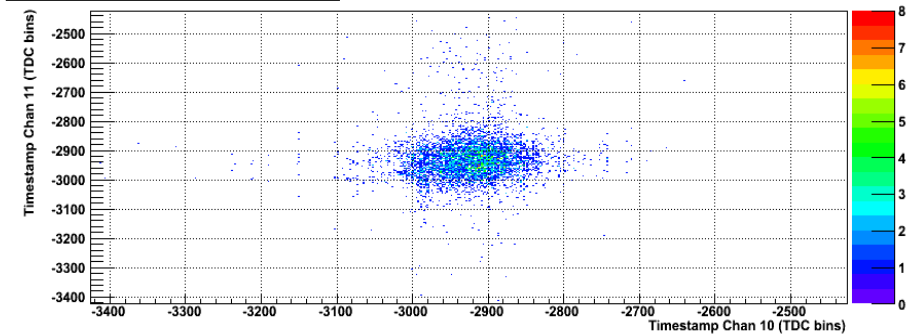
hTdcCorrelation\_Chan10\_Chan11



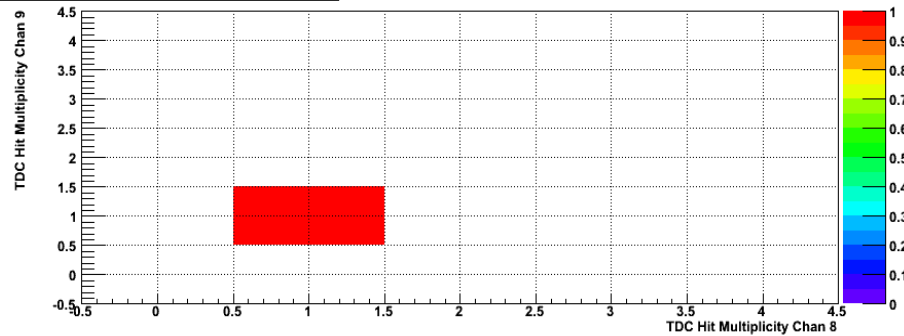
hTdcCorrelation\_Chan8\_Chan9



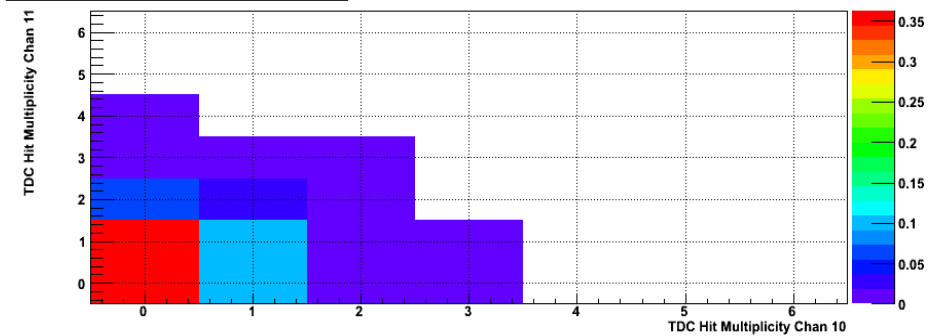
hTdcCorrelation\_Chan10\_Chan11



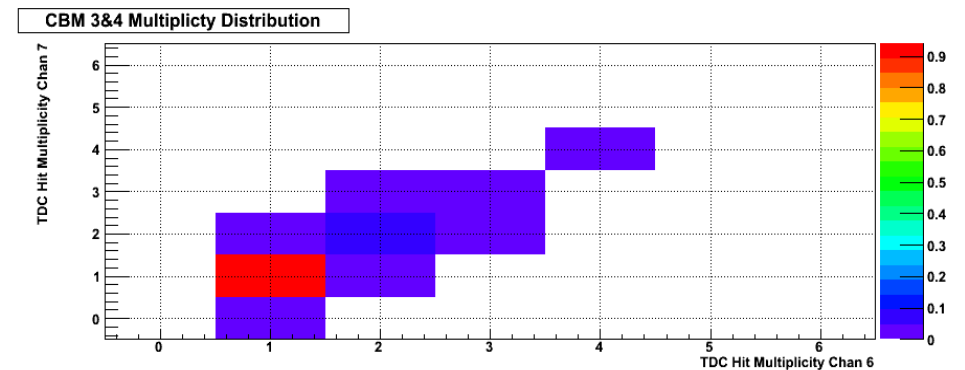
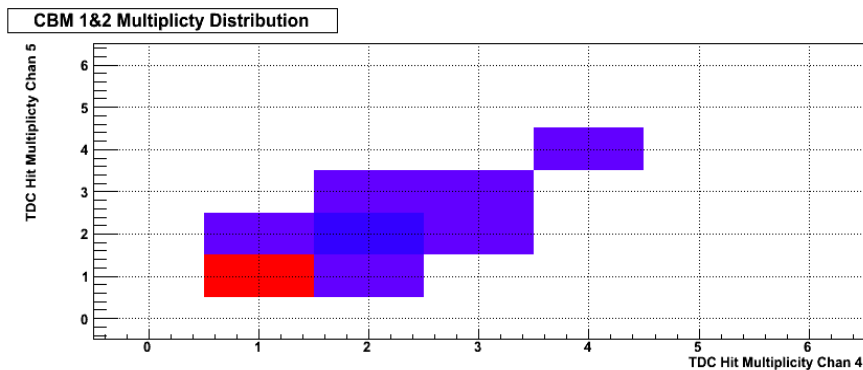
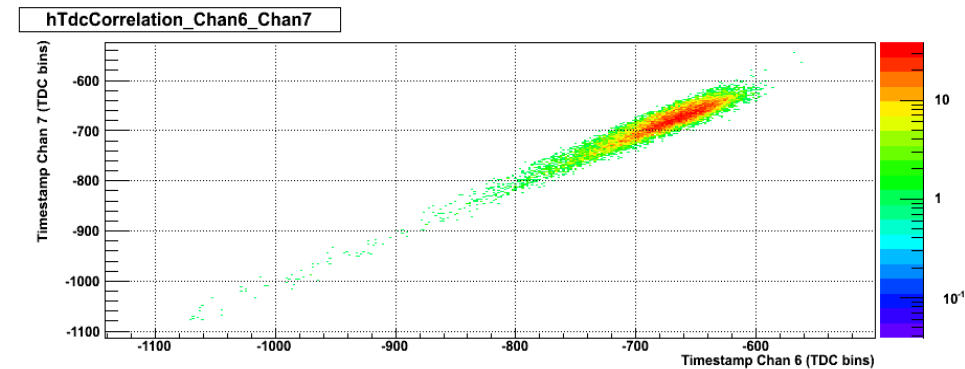
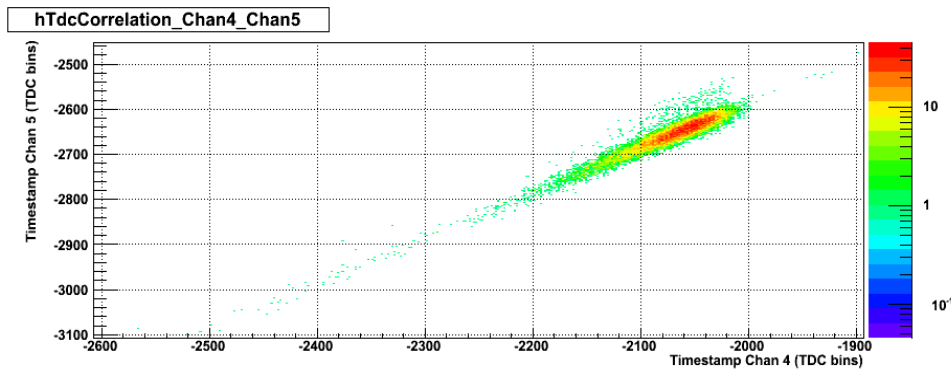
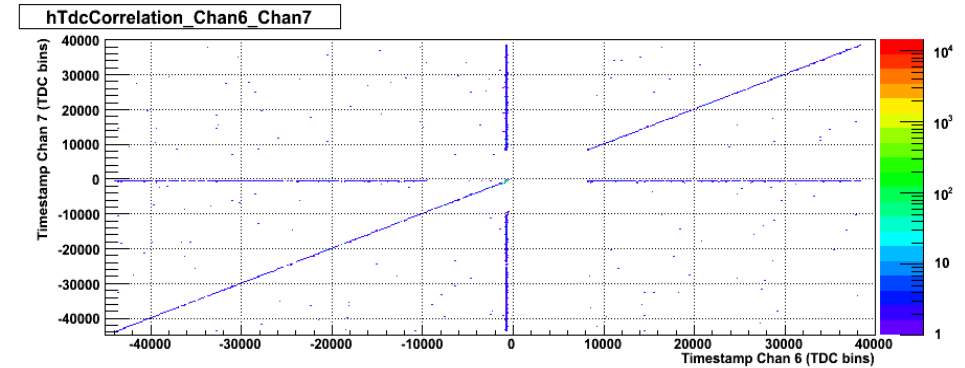
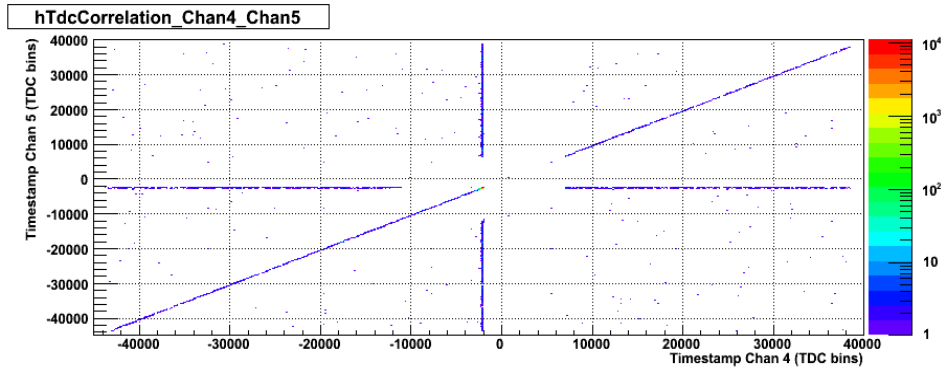
FDIRC 1&2 Multiplicity Distribution



FDIRC 3&4 Multiplicity Distribution

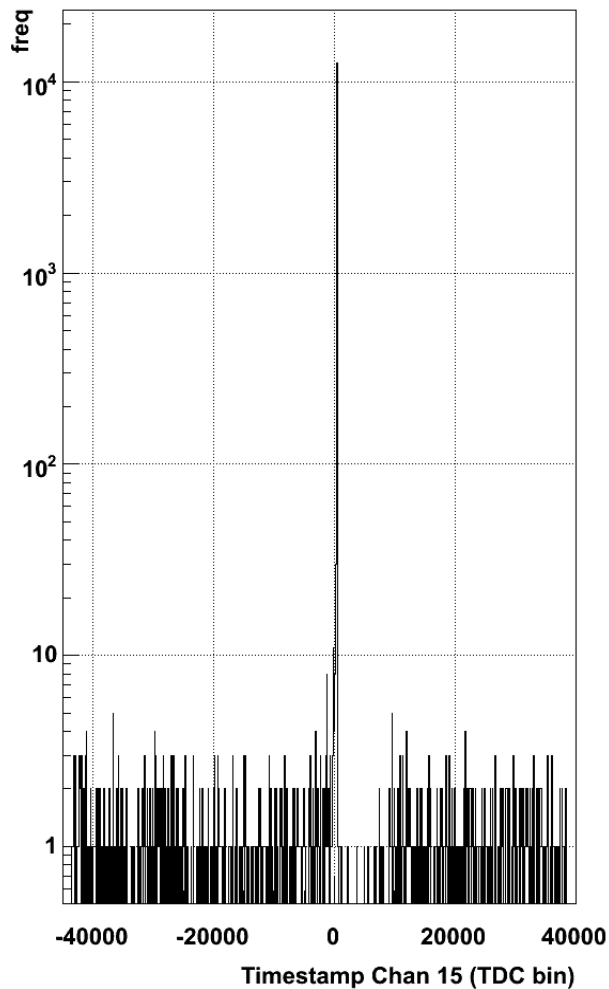


# 1<sup>st</sup> Test Experiment at GSI – CBM Trigger System

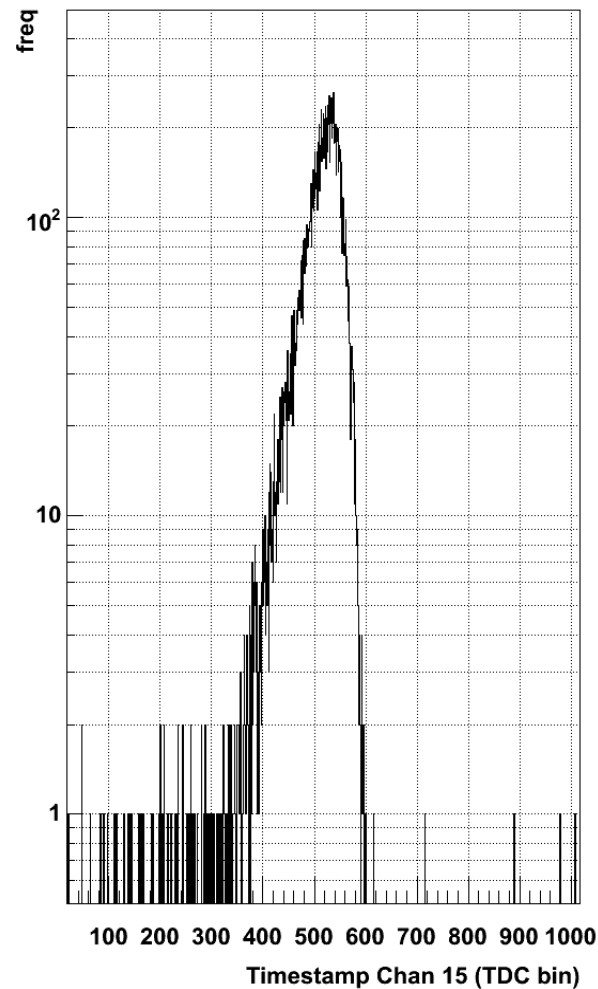


# 1<sup>st</sup> Test Experiment at GSI – Barrel DIRC Beam Counter

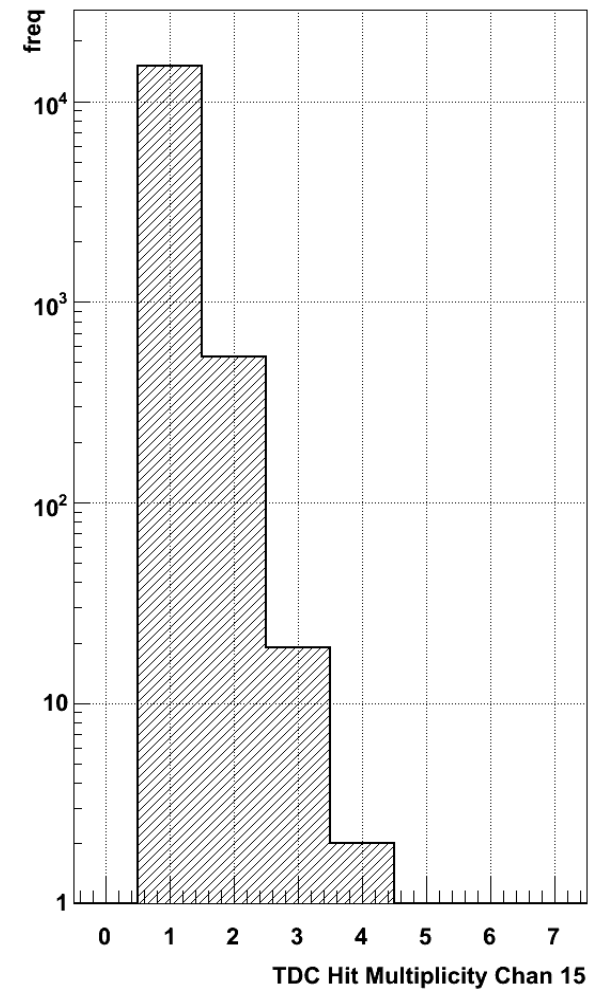
TDC spectrum of Barrel DIRC scintillator



TDC spectrum of Barrel DIRC scintillator

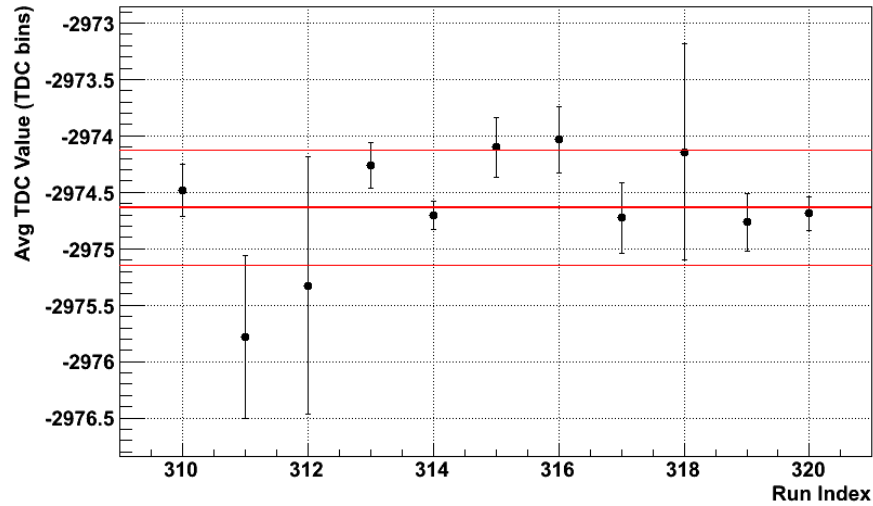


Barrel DIRC Trigger Multiplicity

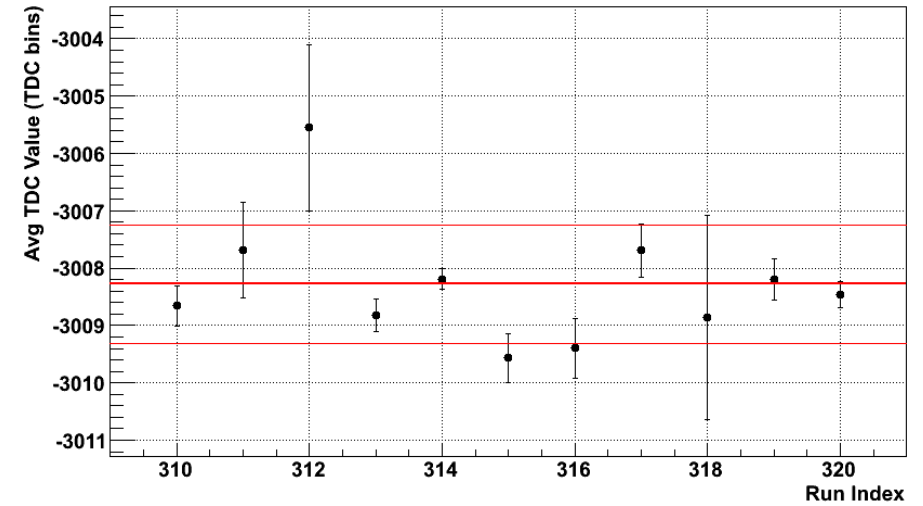


# 1<sup>st</sup> Test Experiment at GSI – Signal Stability

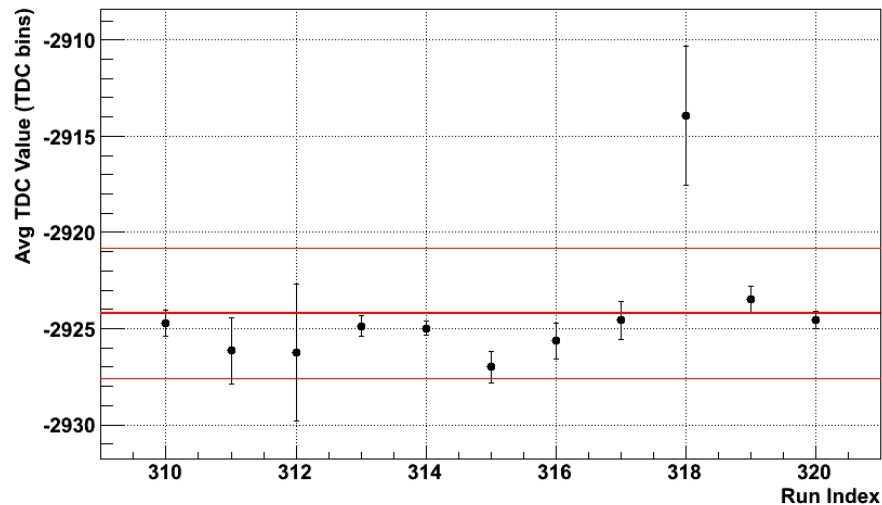
FDIRC Trigger Scintillator 1



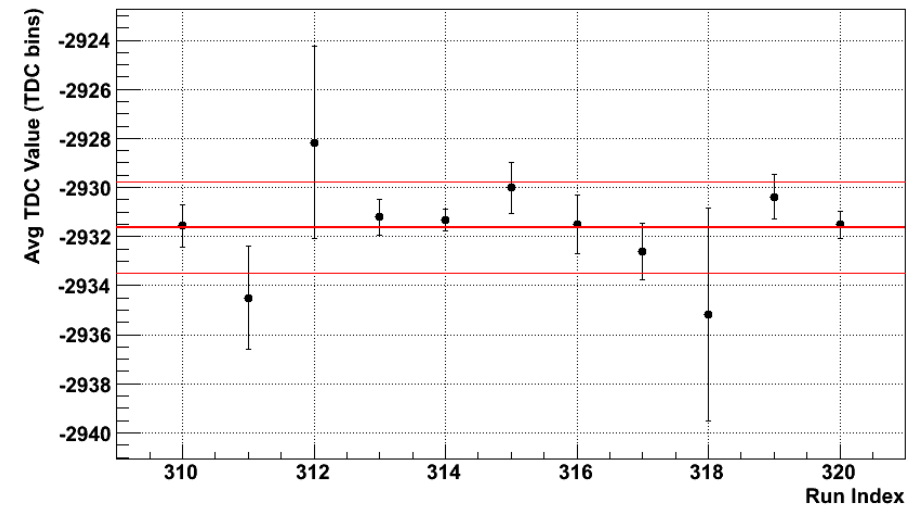
FDIRC Trigger Scintillator 2



FDIRC Trigger Scintillator 3

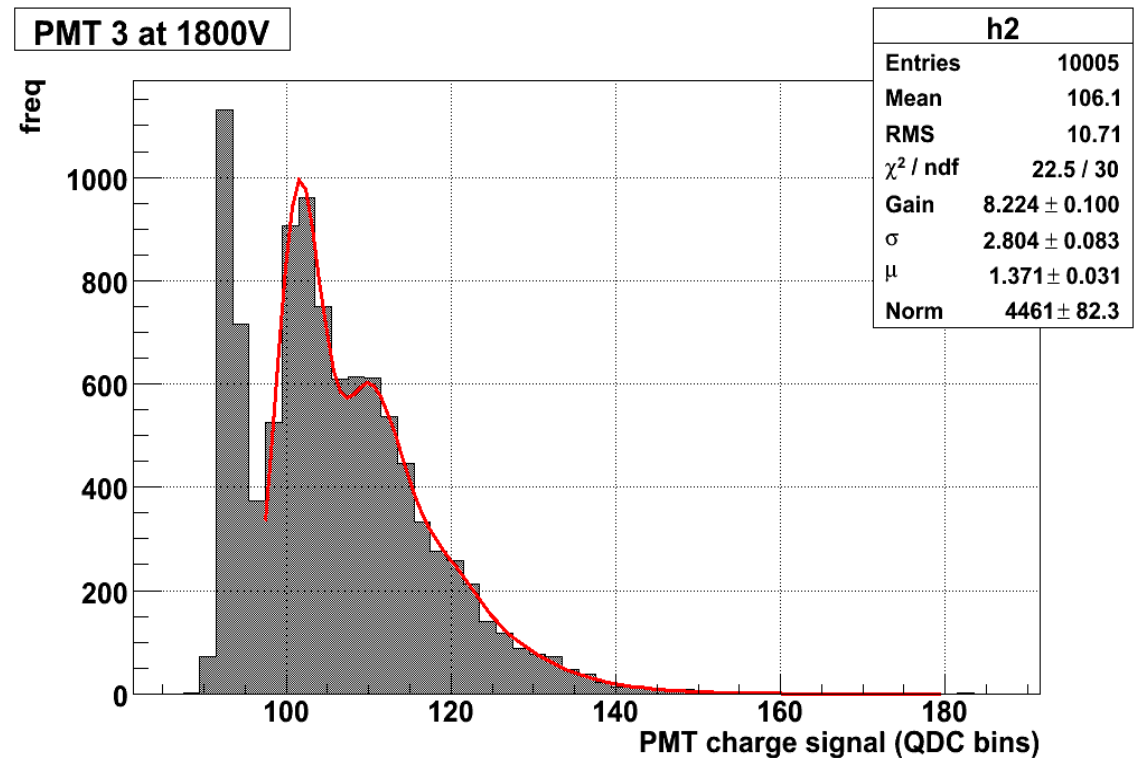


FDIRC Trigger Scintillator 4



## 1<sup>st</sup> Test Experiment at GSI – Calibration Issues

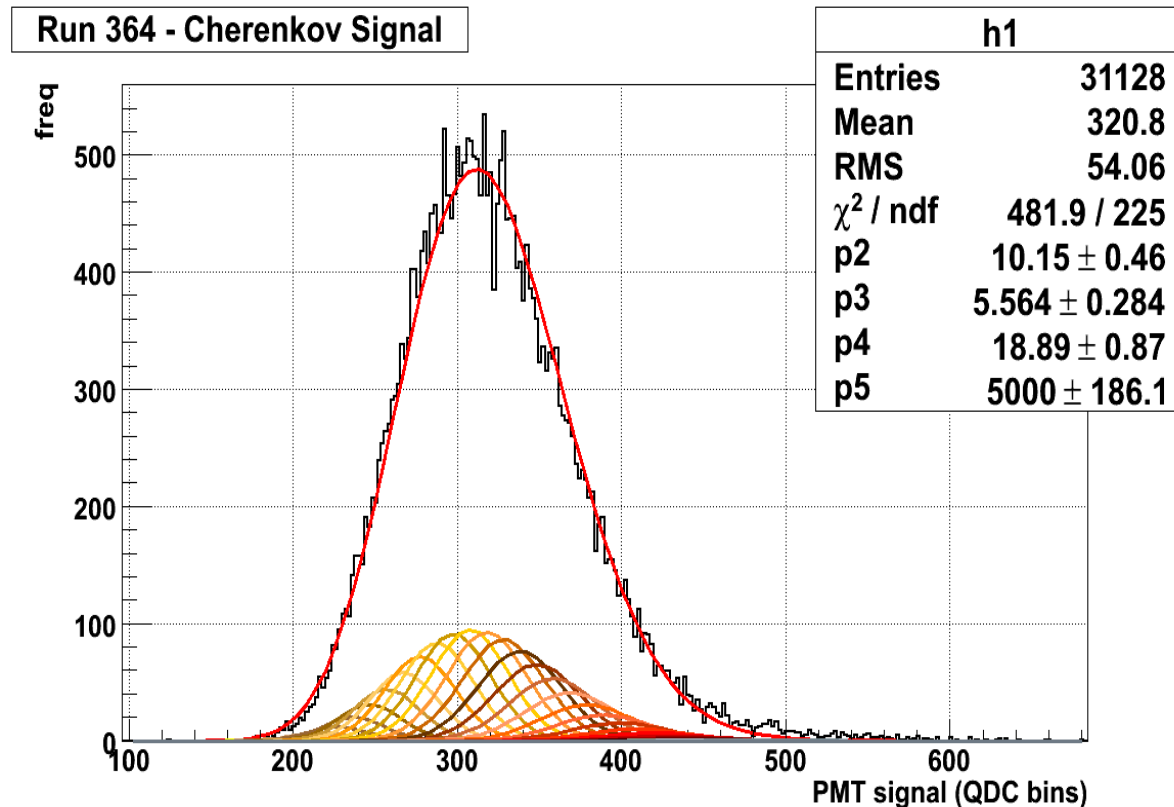
- ▶ Calibration of PMTs
  - ▶ Low light-level spectra at various voltages
  - ▶ Extract gain and mean no of photons
  - ▶ No In-Situ calibration at GSI
- ▶ Problems with discharges when mounted in frame
- ▶ Use same fit function for Cherenkov spectra





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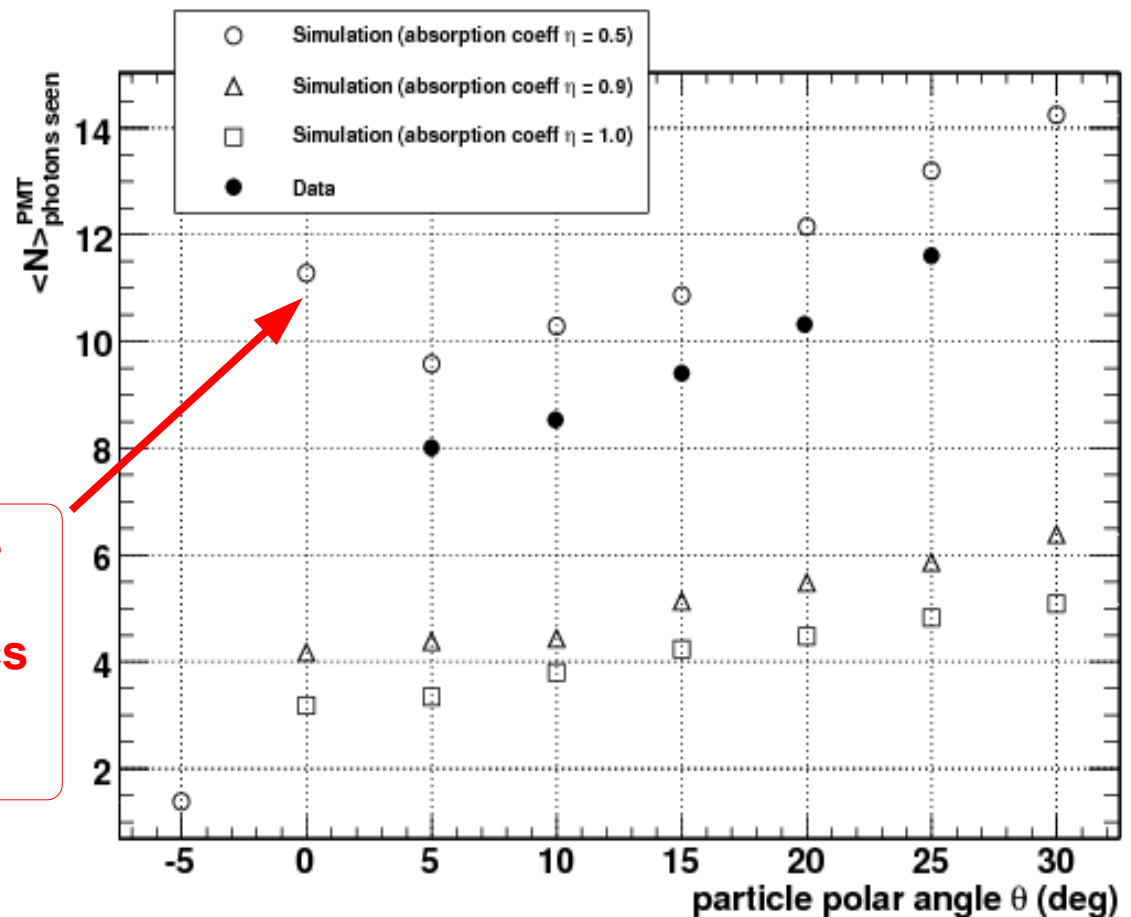
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- ▶ Use same fit function for Cherenkov spectra
  - ▶ 25% Gain mismatch observed



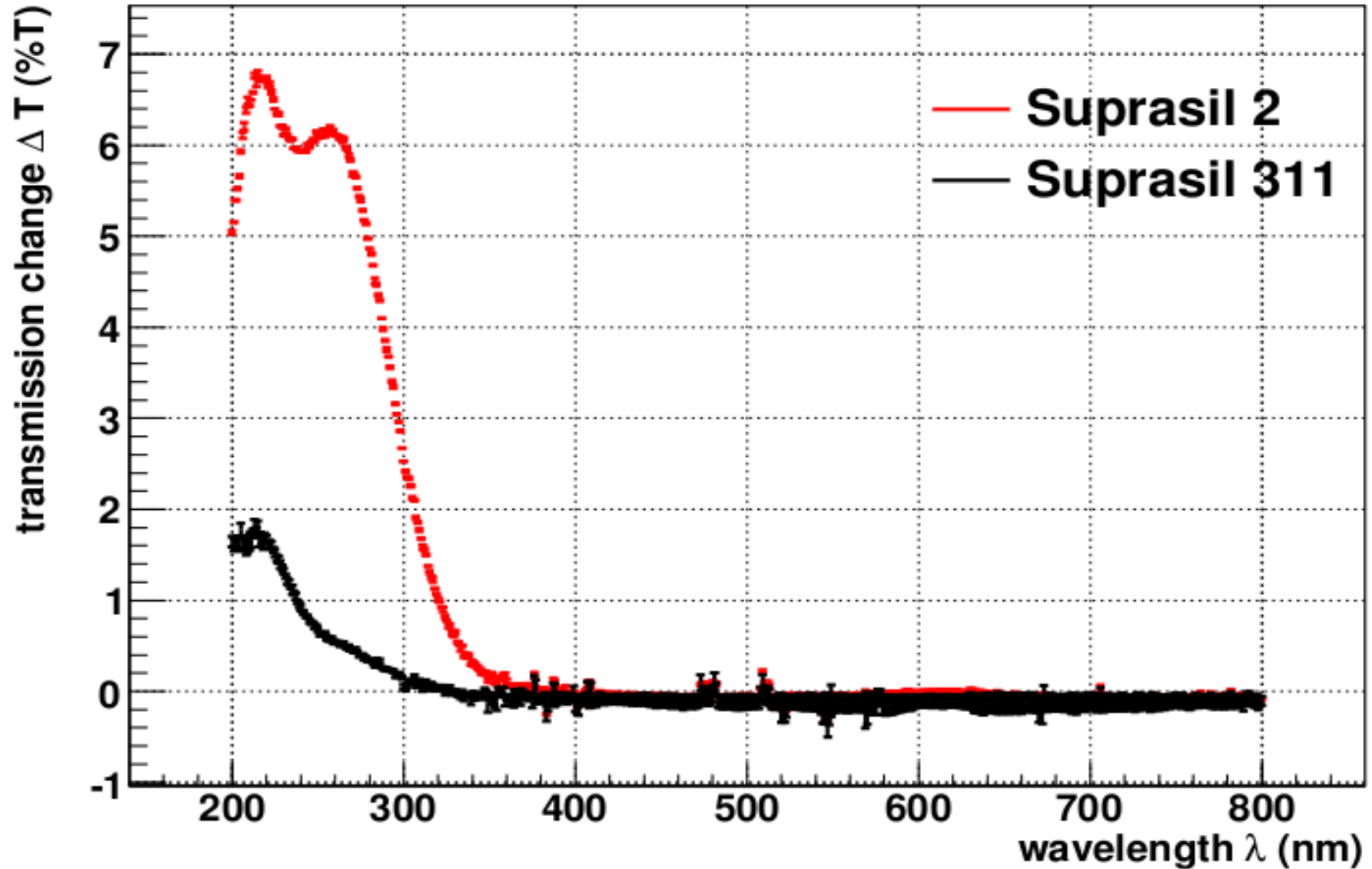
## 1<sup>st</sup> Test Experiment at GSI – Preliminary Results

- ▶ Absorption at bar edges
  - ▶ Cross check with independent measurement
- ▶ Positioning accuracy
  - ▶ LITRANI simulations indicate error < 1 p.e. for  $\Delta z \sim 1\text{cm}$

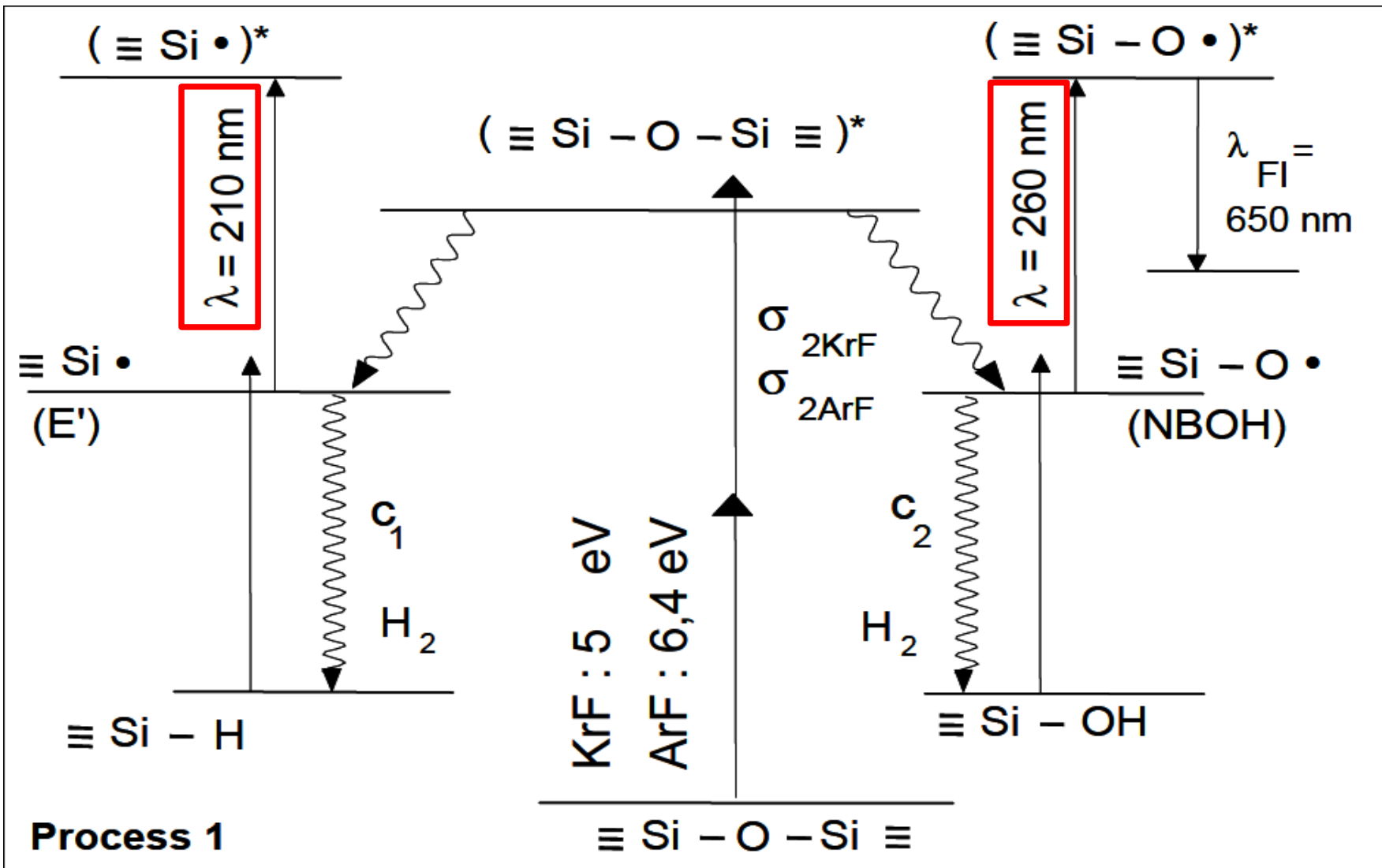
**Rise depends on surface characteristics of far end of bar**



## Radiation Hardness Studies - Suprasil

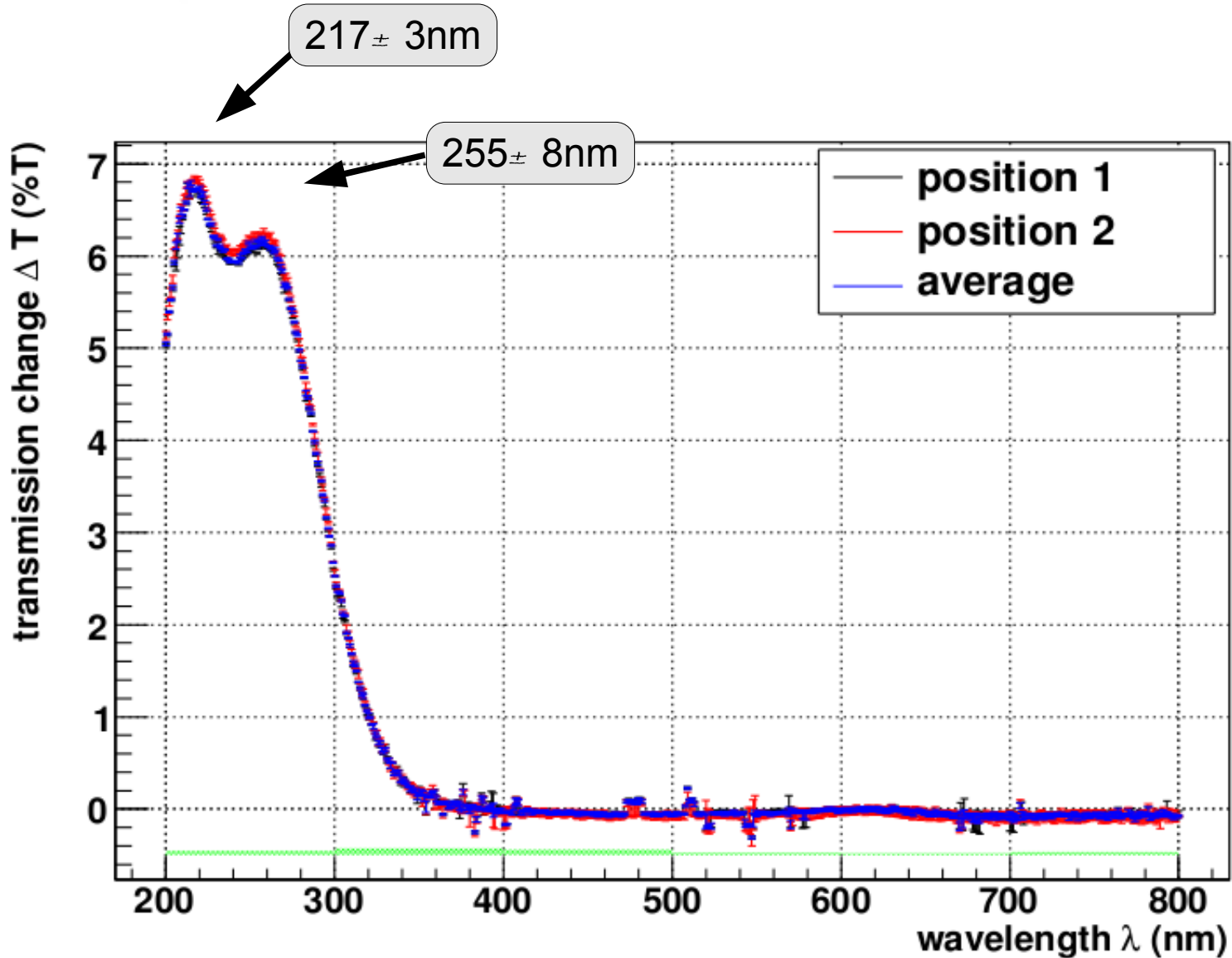


## Radiation Hardness – Fused Silica Defect Mechanisms

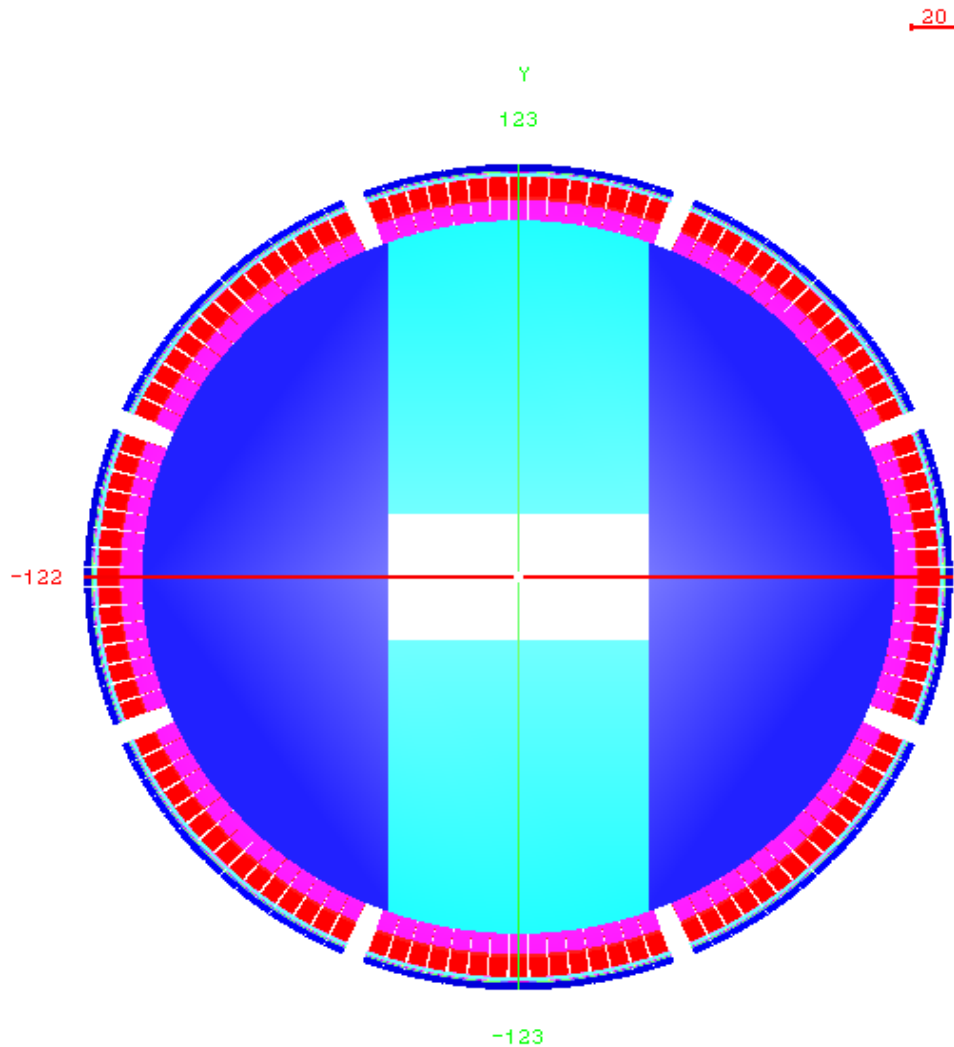


U. Natura et al., Proc. Of SPIE Vol. 5273 (2003), pp 155-163

## Radiation Damage in Suprasil 2

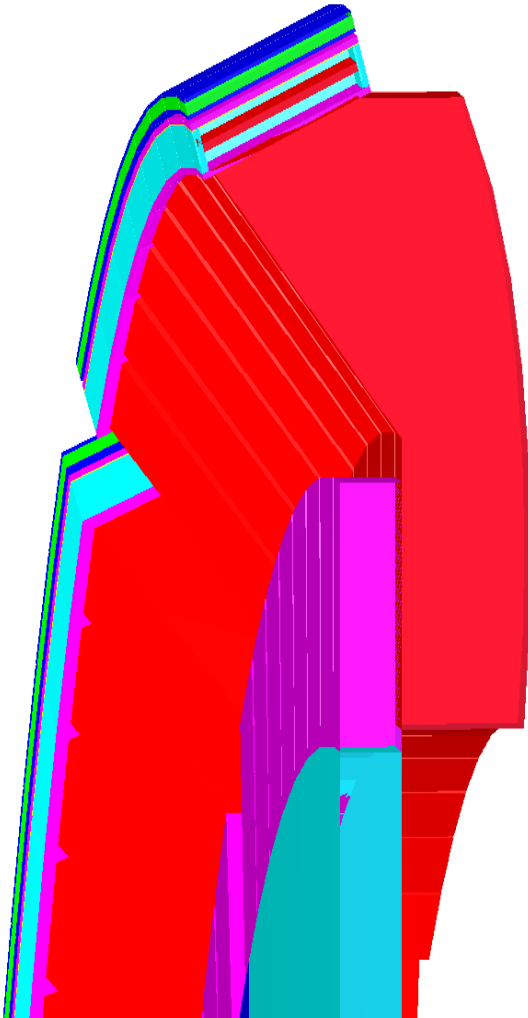


## Focussing Disc DIRC in Panda RooT



- ▶ First preliminary implementation by D. Glazier
  - ▶ Not in the official repository
- ▶ Additional work on LG shape required
- ▶ Detailed description of readout
  - ▶ MCP model
  - ▶ Electronics
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## Outlook & Plans

- ▶ **Prototype**
  - ▶ Include Focussing Optics and Dispersion Correction Element
  - ▶ Position-Sensitive Photon Detector
  - ▶ Cosmics until next Test Experiment at GSI
- ▶ **Electronics**
  - ▶ NINO + HPTDC and Planacon MCP
  - ▶ Radiation Load Simulation (Endcap-EMC)
- ▶ **Simulations**
  - ▶ Include Focussing Disc DIRC in Panda Root
  - ▶ Optimise LITRANI simulation of prototype with Focussing Lightguide