

# Investigating bar glue joints with dimuons

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- Introduction
- First data plots
- Corresponding MC predictions
- Data/MC comparison
- MC with glue reflectivity set to 0
- Next steps

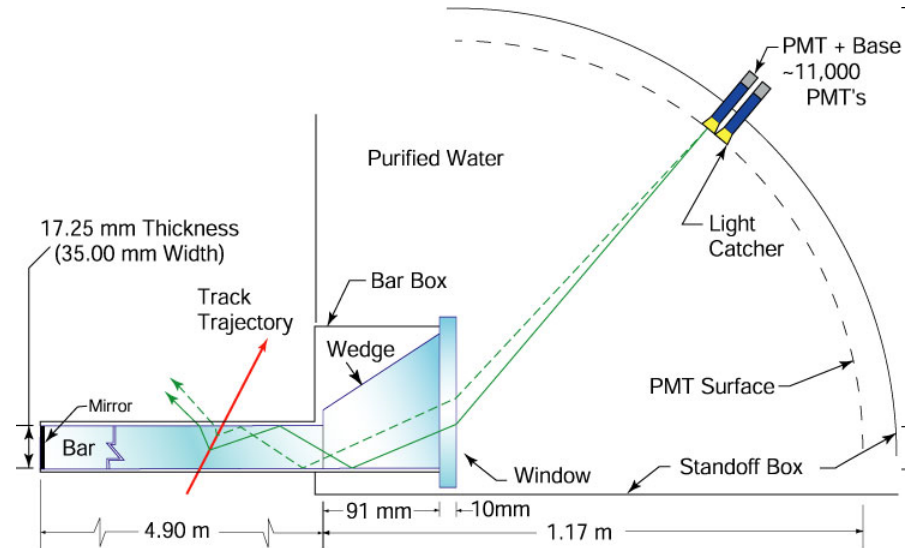
**Disclaimer (to Jerry & Dave):**  
**study not updated since my**  
**stay at SLAC in April**  
**⇒ No new information for you...**

# Introduction

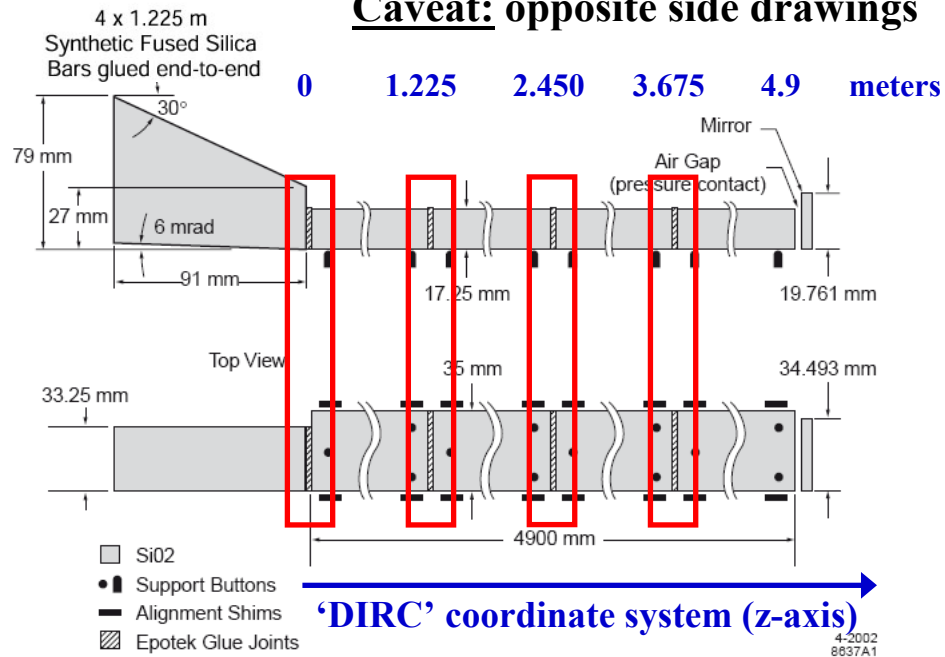
- BaBar DIRC quartz bars to be reused for the SuperB PID barrel
  - Important to know in which shape they currently are
  - Will define the amount of service needed on the bar boxes
- Two main monitoring approaches
  - open barboxes and test reflectivity with a laser
  - use clean dimuon events recorded at BaBar over the years + MC
- Work still in progress
  - main aim of this talk is to show its status and get feedback/comments
  - DIRC 'review committee: [Jerry Va'Vra](#)  
[Dave Aston](#)  
[Jochen Schwiening](#)
- Final results to be compiled in a note useful for BaBar and SuperB

# DIRC bars in a nutshell

- 144 bars in the DIRC
- 12 bar boxes
- A bar is 4.90m long
- Each bar is made of 4 smaller bars glued with Epotek joints
- Are the joints still transparent?  
 → ‘Yellowing’ process on joints left on the air for years  
 → Bar boxes are sealed, dry and protected from outside light
- Diagnosis tools: profile of the # of photons / track path length in quartz + data/MC comparison

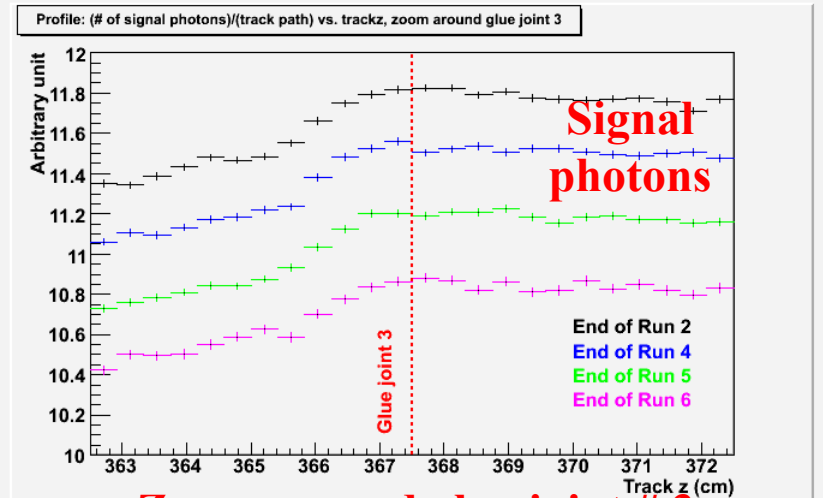
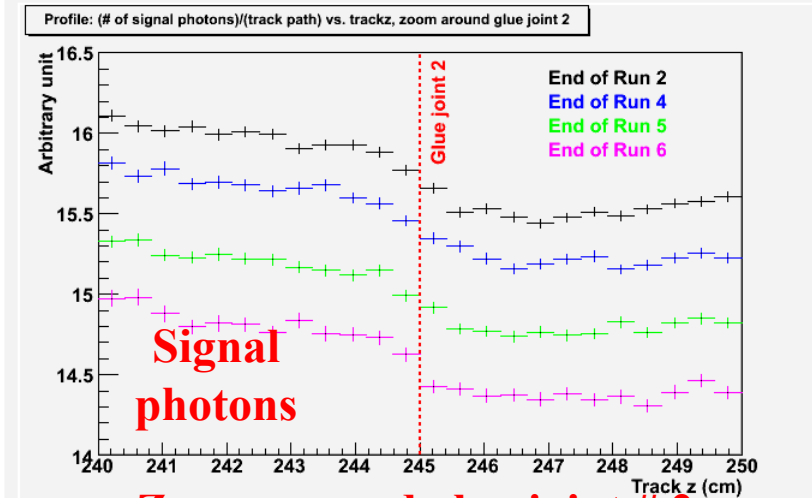
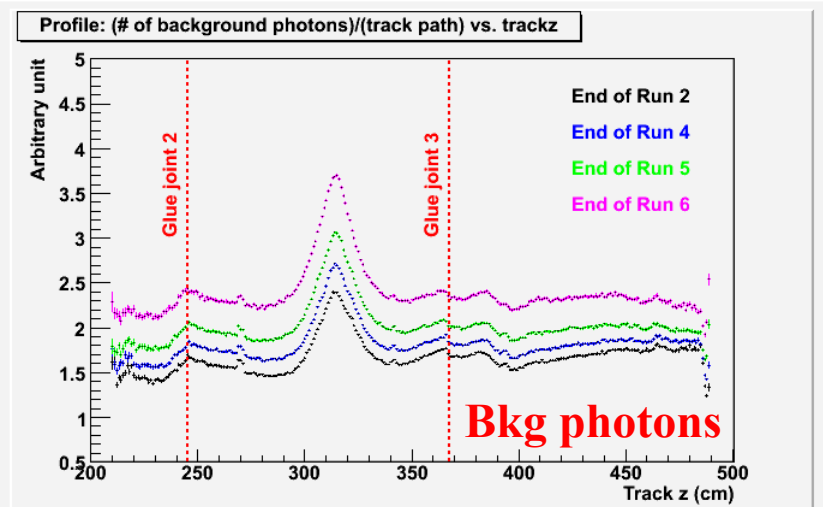
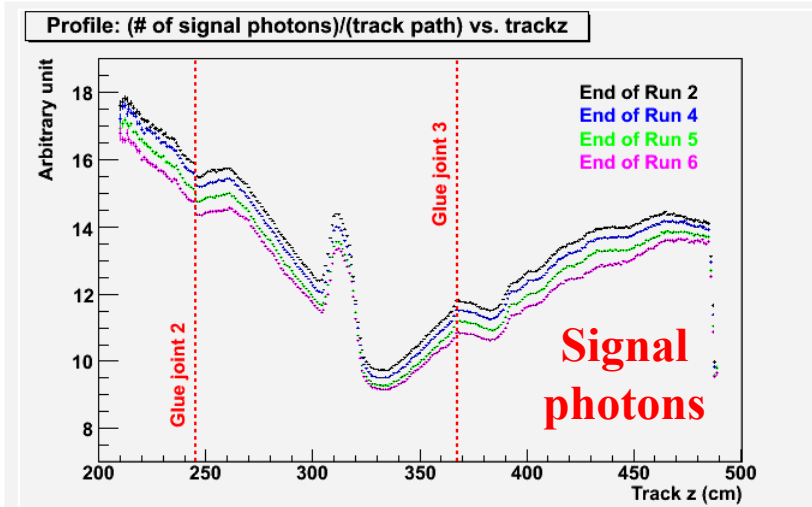


**Caveat: opposite side drawings**



# Profile # of photons / quartz path vs trackz

- Data only: **Run 2**, **Run 4**, **Run 5** and **Run 6** (same colour code everywhere)

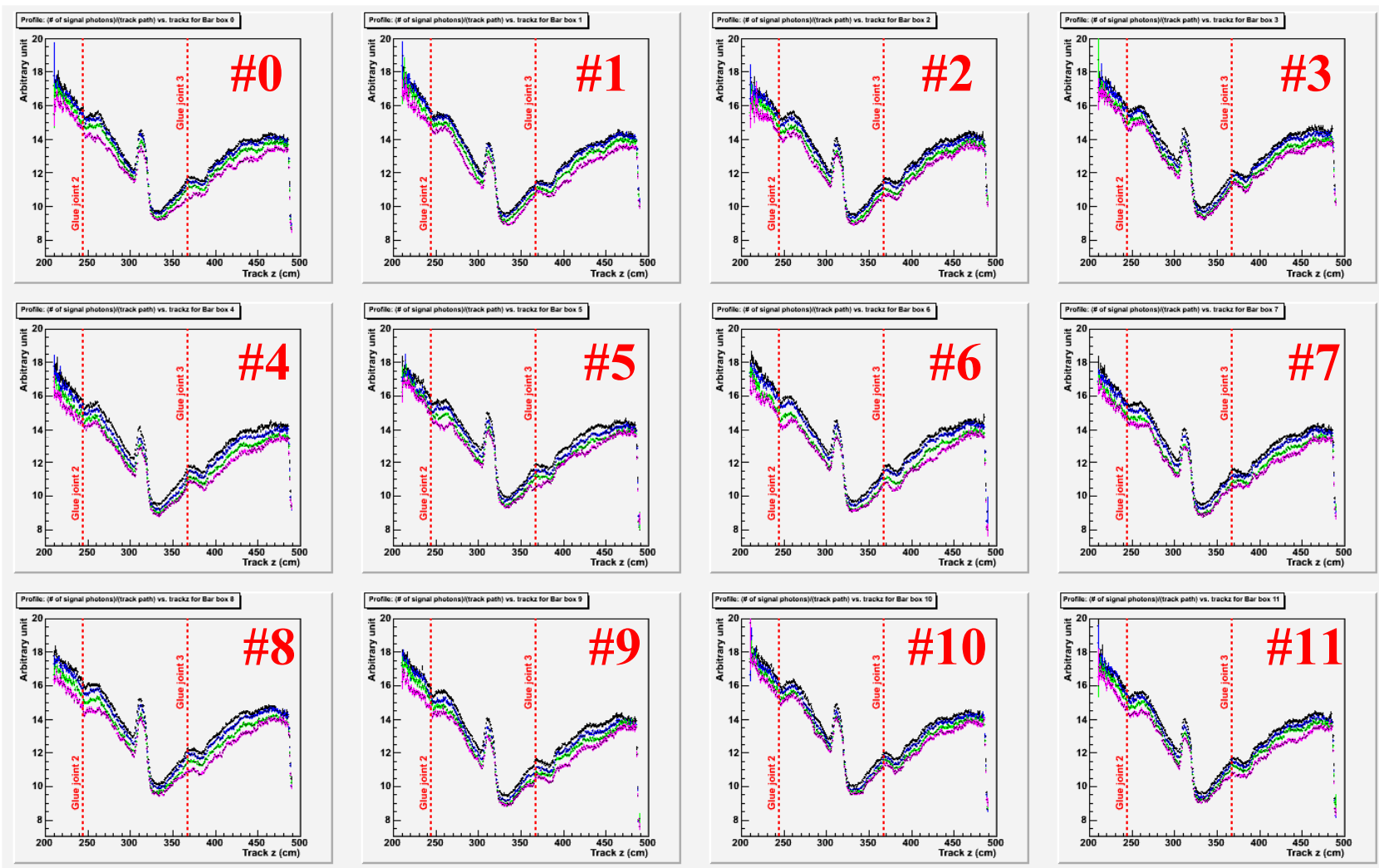


Zoom around glue joint # 2

Zoom around glue joint # 3

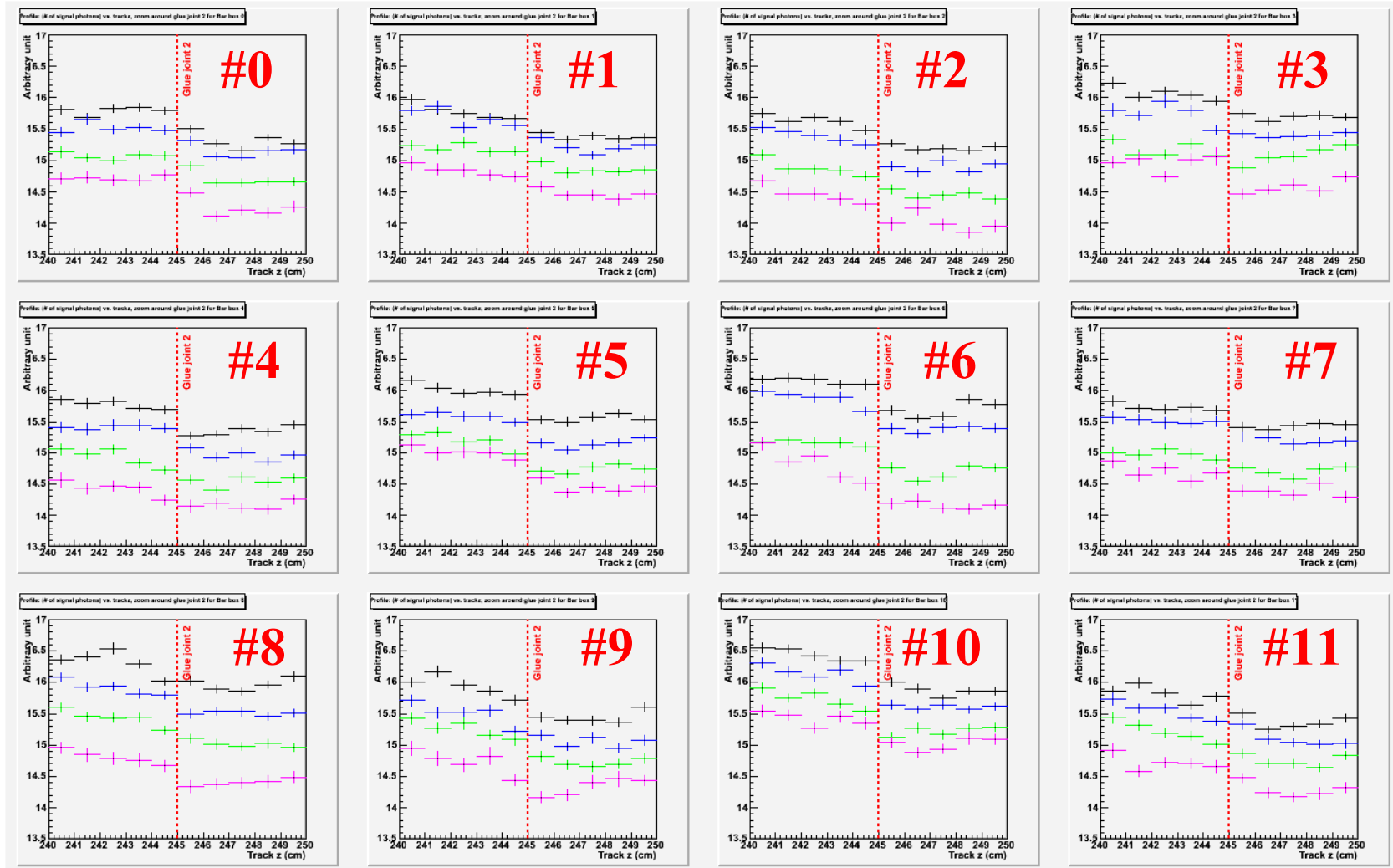
# Barbox by barbox comparison

- Data – profile of the number of signal photons vs. trackz



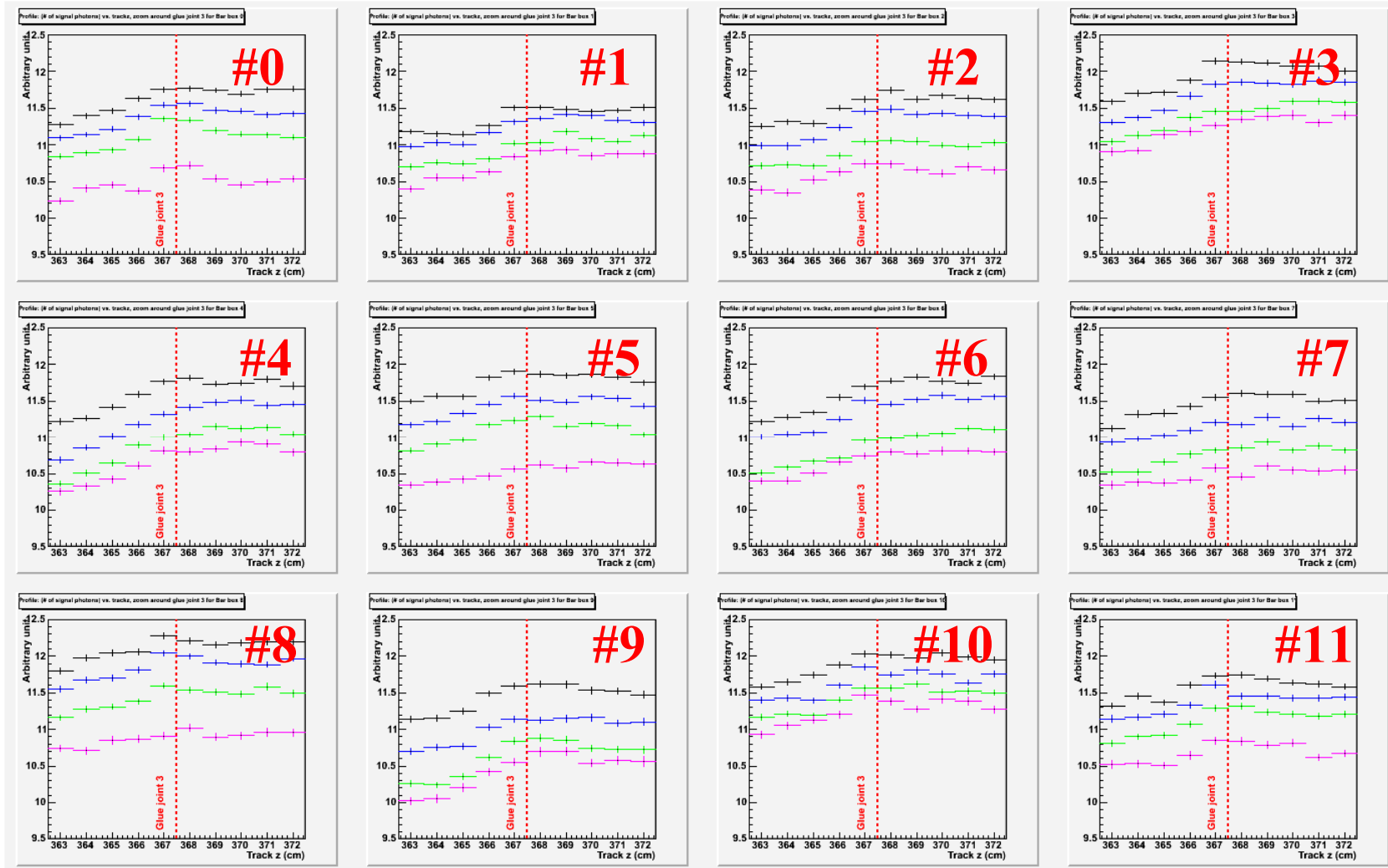
# Similar profiles, zoom around glue joint #2

- Data-based plots, barbox by barbox



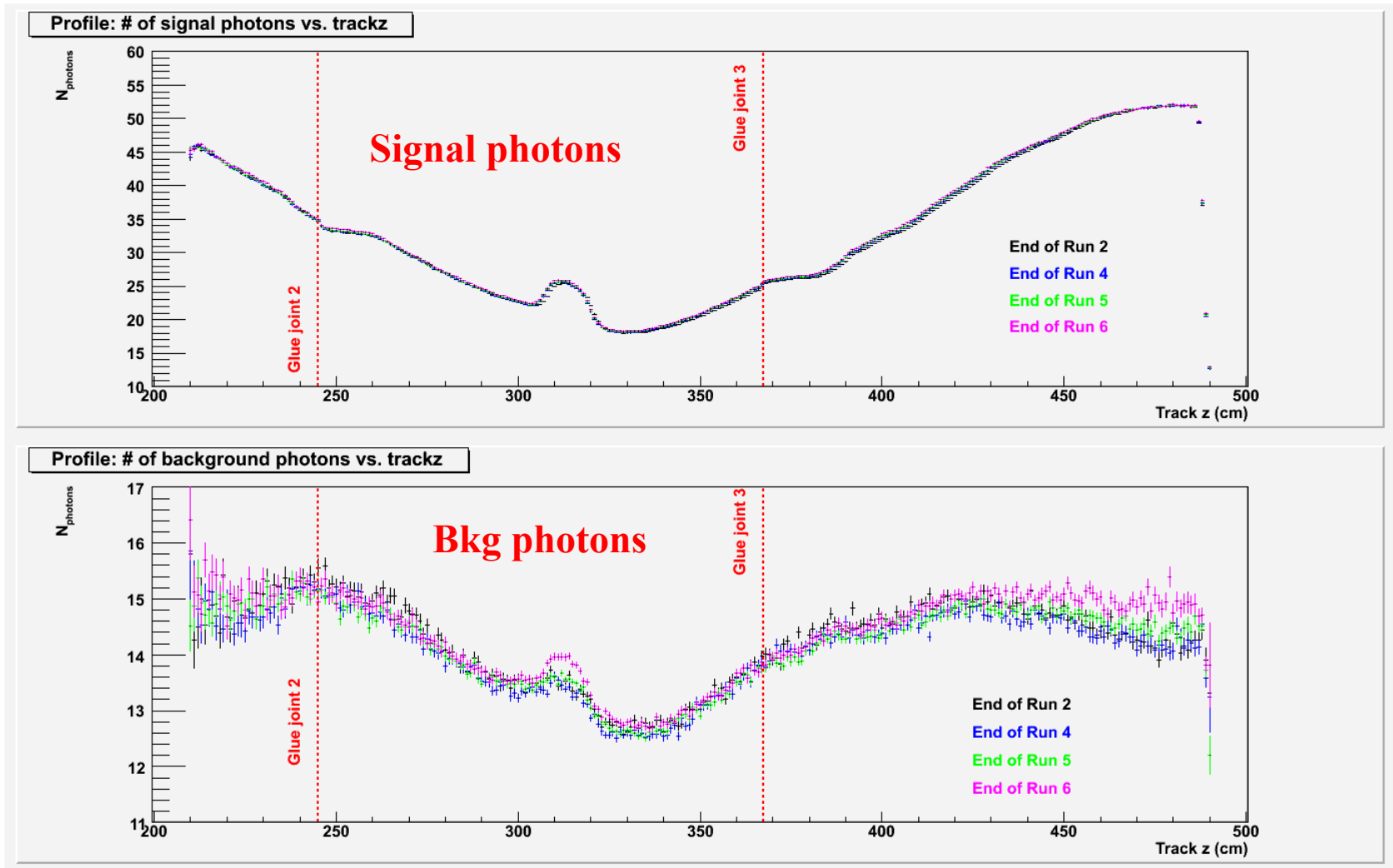
# Similar profiles, zoom around glue joint #3

- Data-based plots, barbox by barbox



# Comparison of the MC predictions

- MC-based plots, same color code than for data

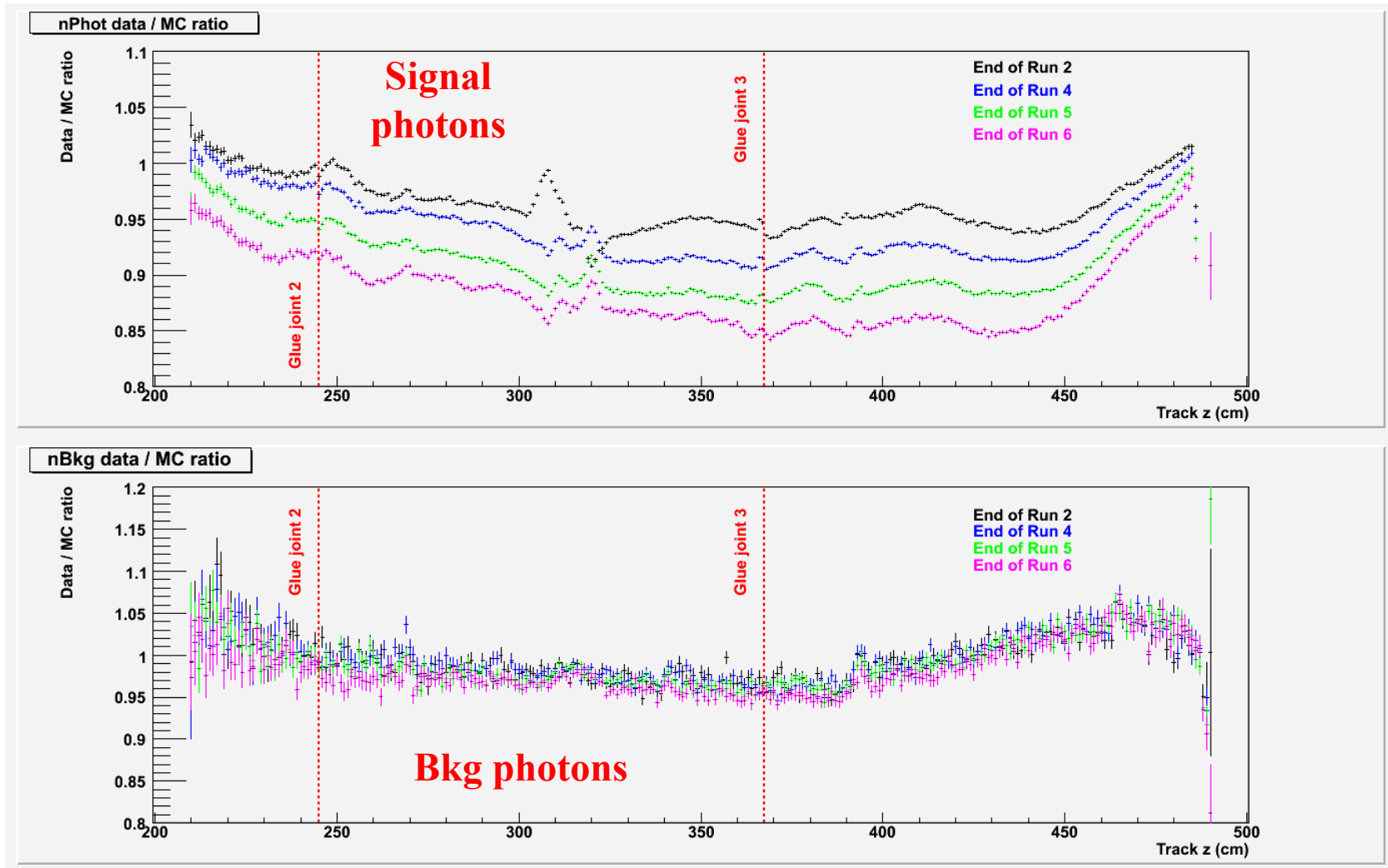


Run 2  
Run 4  
Run 5  
Run 6



# Profile ratios data / MC

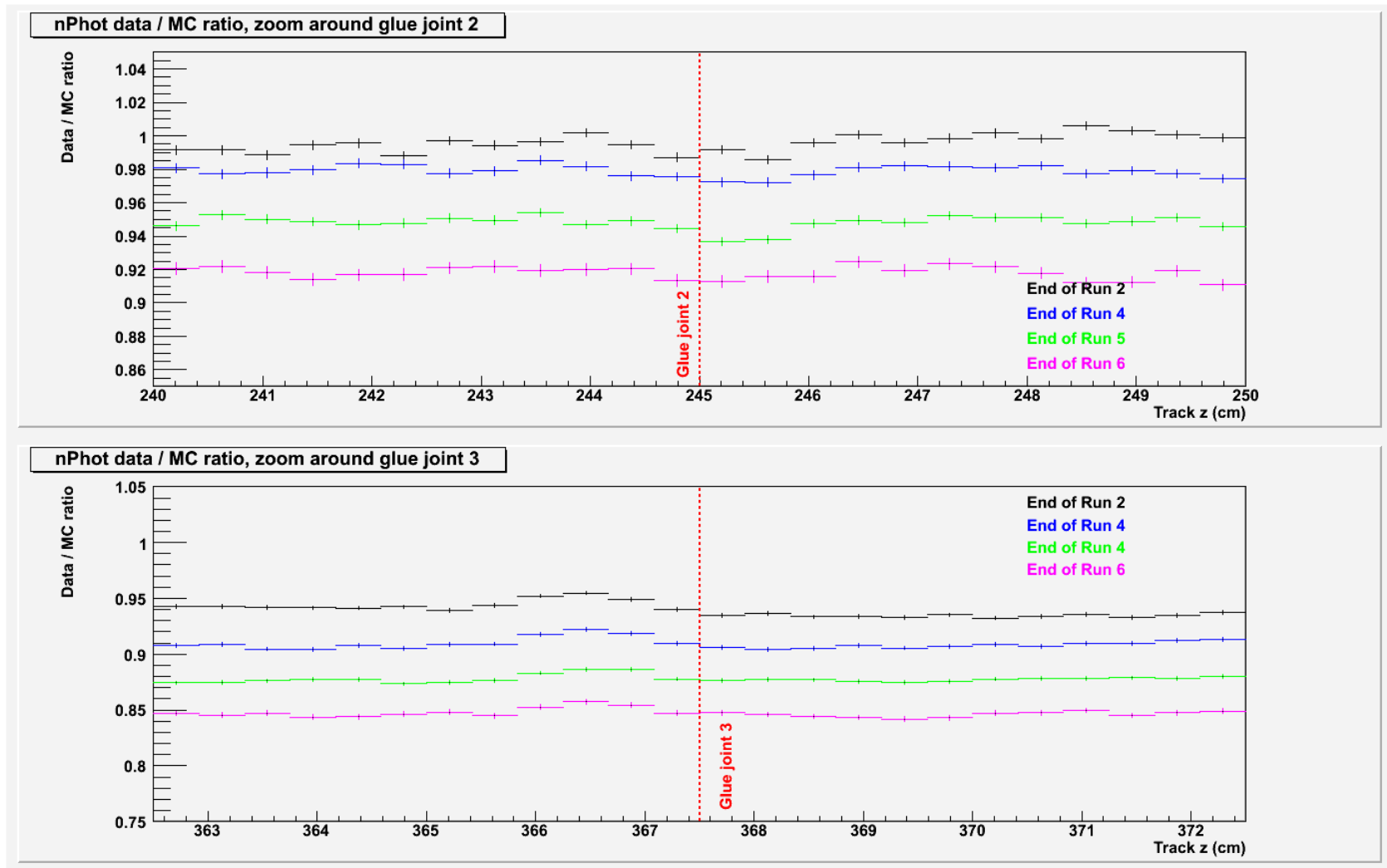
- Data / MC ratios of the number of signal photons profile plots



Run 2  
Run 4  
Run 5  
Run 6

# Same plots, zooms around glue joints

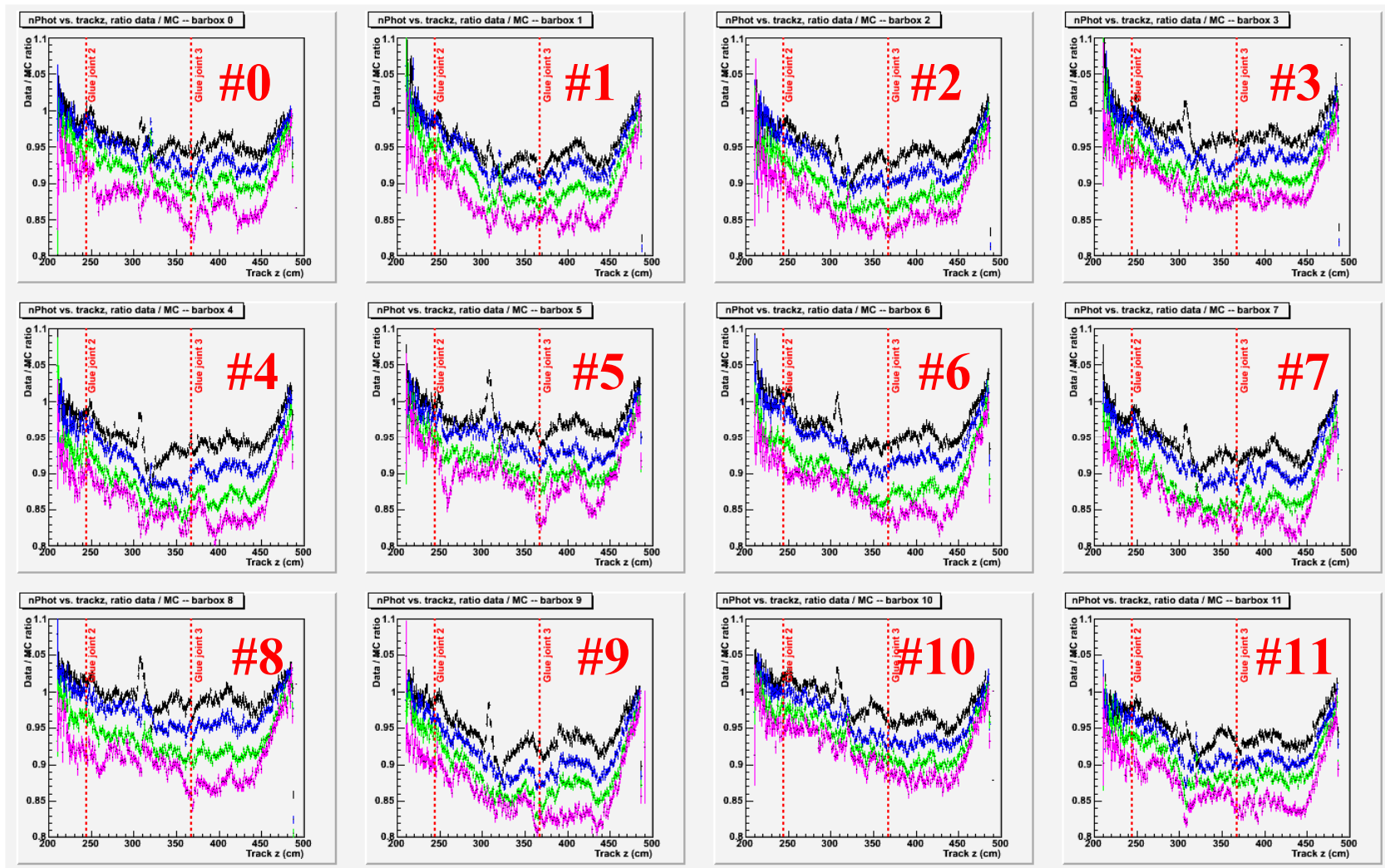
- Data / MC profile plot ratios, same colour code



**Run 2**  
**Run 4**  
**Run 5**  
**Run 6**

# Same plots, barbox by bar box

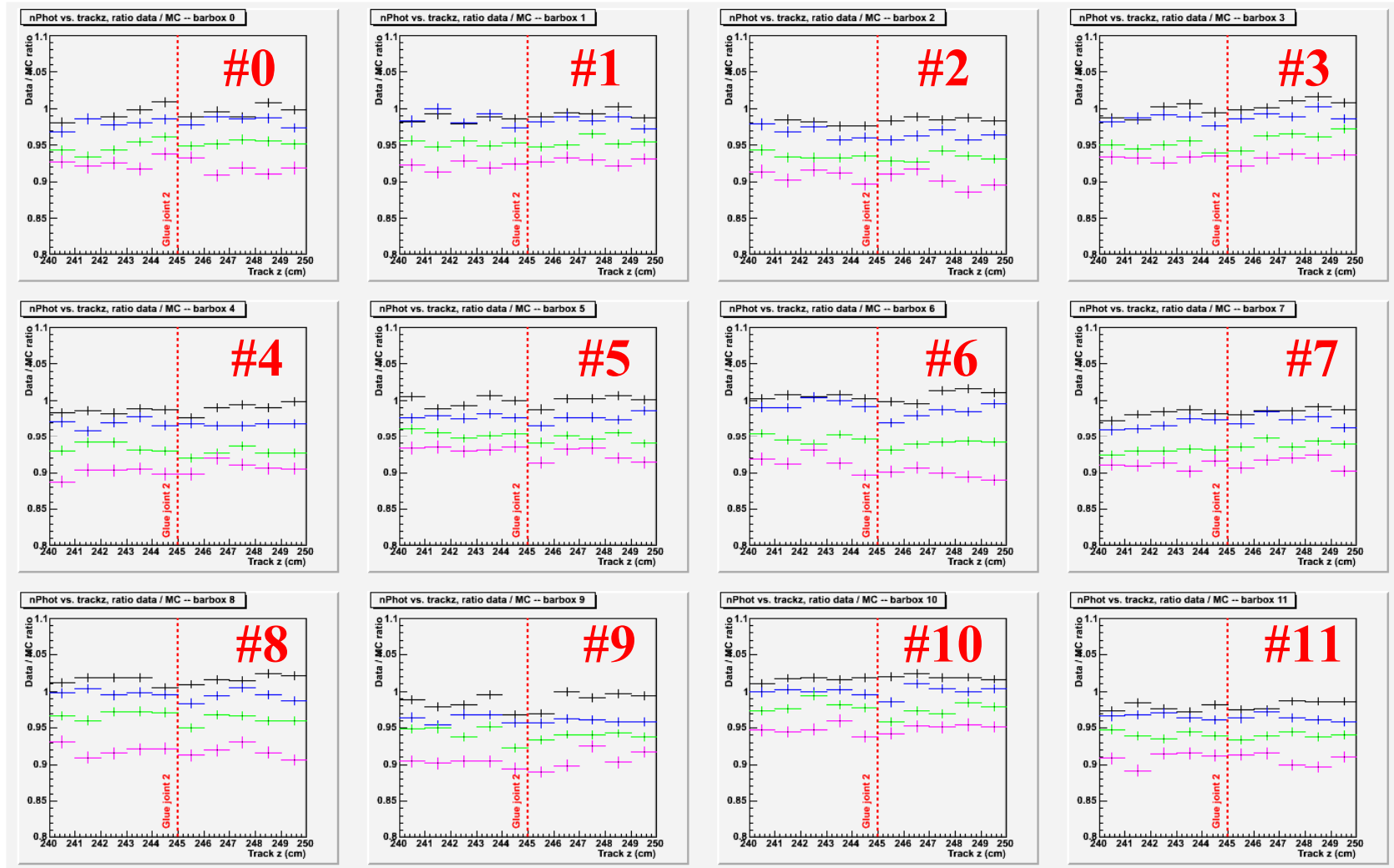
- Data / MC profile plot ratios, same colour code



Run 2  
Run 4  
Run 5  
Run 6

# Same plots, zoom around glue joint #2

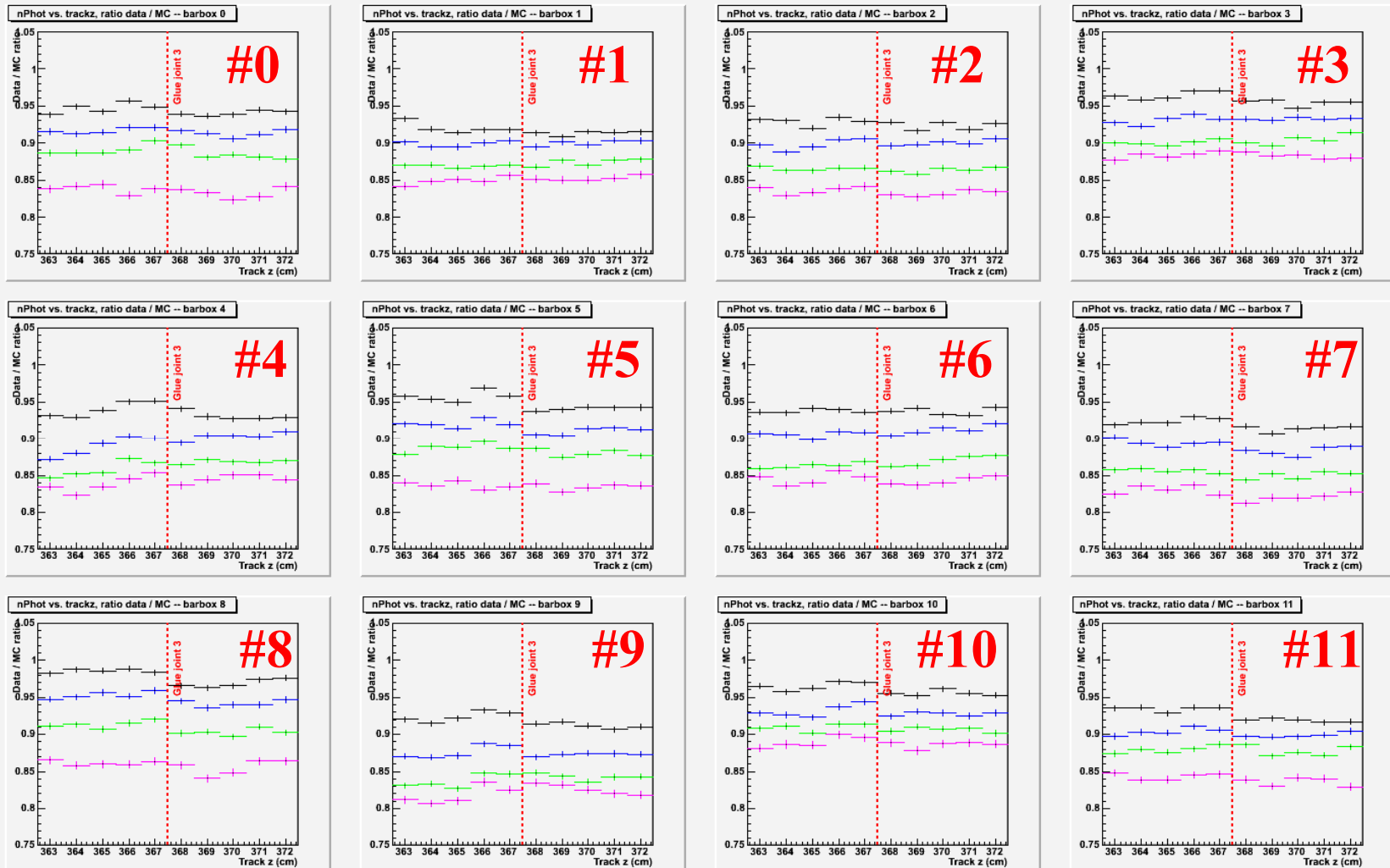
- Data / MC profile plot ratios, zoom around glue joint #2



Run 2  
Run 4  
Run 5  
Run 6

# Same plots, zoom around glue joint #3

- Data / MC profile plot ratios, zoom around glue joint #3



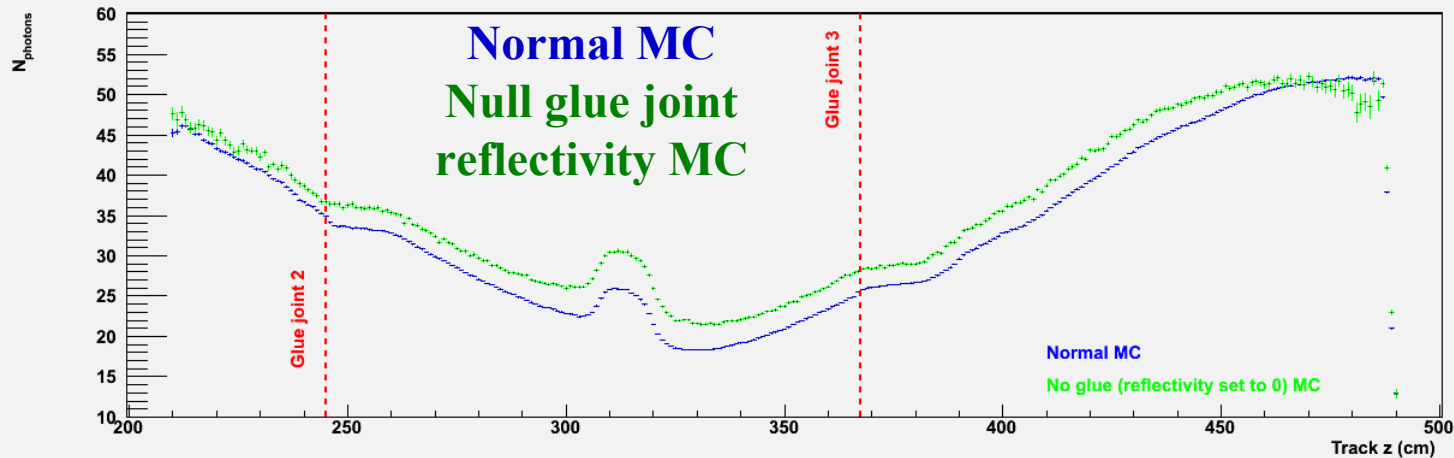
Run 2  
Run 4  
Run 5  
Run 6

# Null reflectivity for glue joints

- Profile of the number of signal photons versus trackz

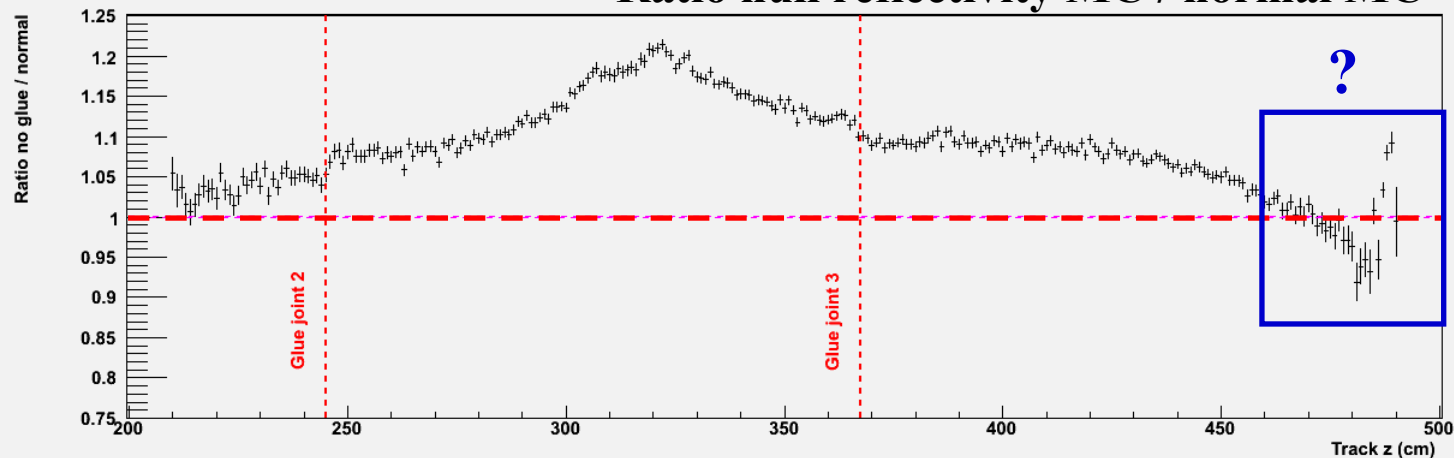
Private MC  
1 MEvents

Profile: # of signal photons vs. trackz



MC comparison: no glue / normal

Ratio null reflectivity MC / normal MC



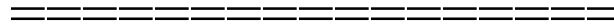
Run 6  
MC

Doesn't sound  
like a fluctuation

Ratio = 1

# First Conclusions, Next Steps

- No clear sign of deterioration over time
  - No significant dependence over the bar boxes
- } Encouraging!



- Look at profiles vs.  $\cos(\theta_{\text{track}})$  instead of  $z_{\text{track}}$
- Are the glue joints at the same locations in data and MC?
- Process all the BaBar data divided in big chunks (a few per Run)
- Try to fit areas around the glue joints with a straight line or two straight lines separated by a step of floating size  
→ If this works, plot results vs.  $\begin{cases} \text{run number} \\ \text{accumulated luminosity} \end{cases}$
- Feedback/questions/comments more than appreciated

