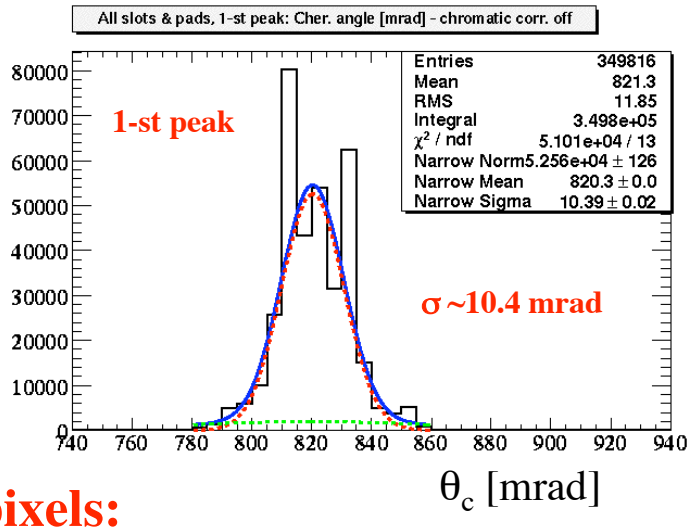
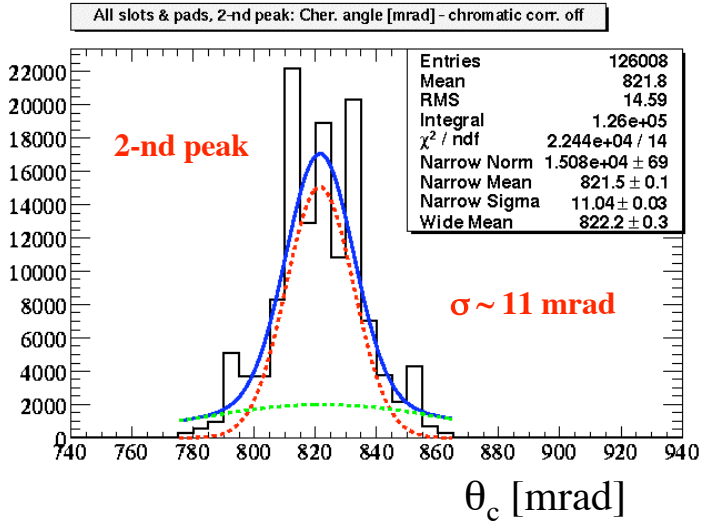
Analysis of runs 16-22

Uncorrected distributions - pos 1, both peaks

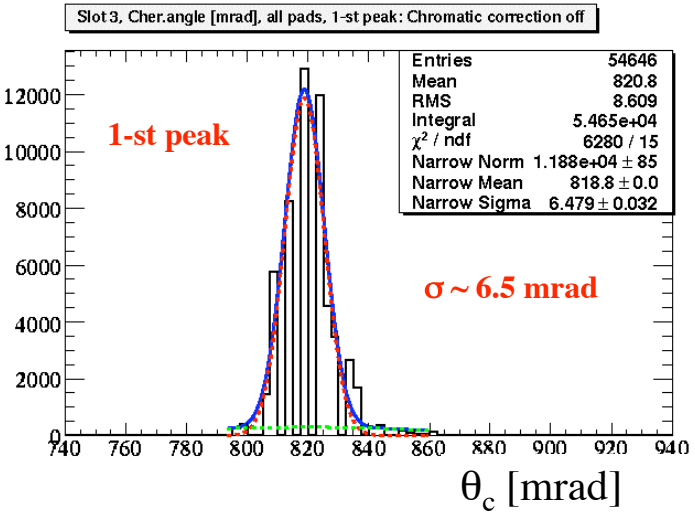
(J.V.'s analysis)

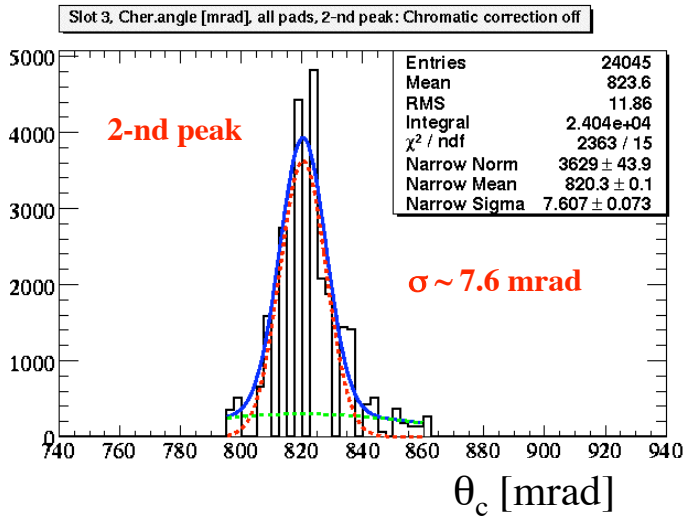
All pixels:





3mm pixels:

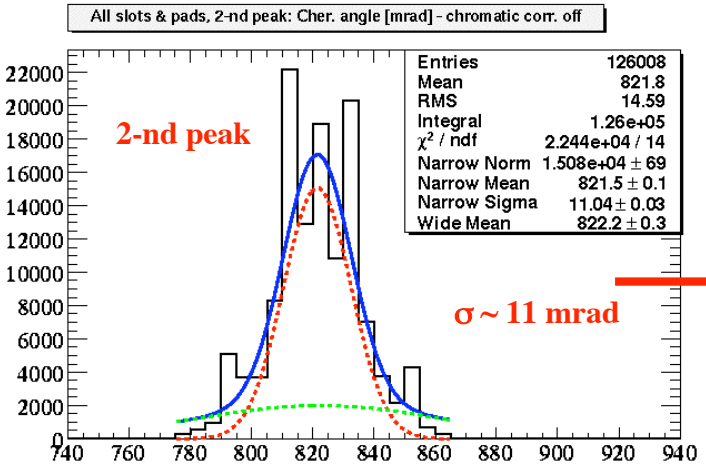


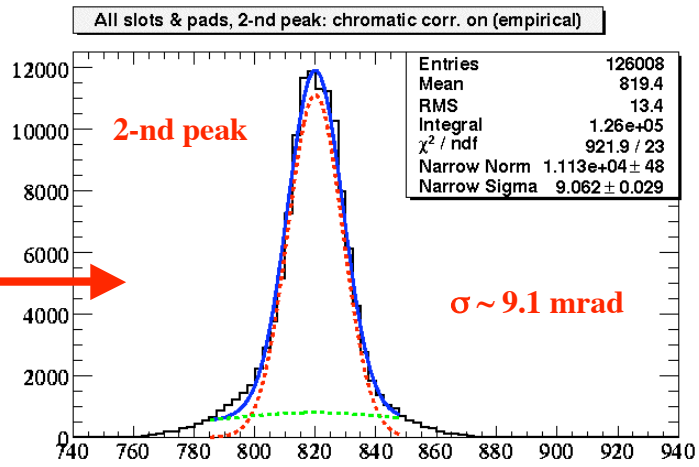


Chromatic corrections - pos 1, peak 2

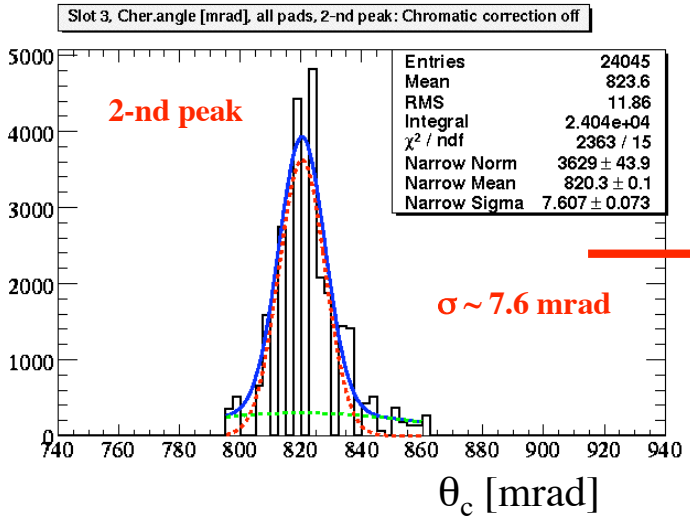
(J.V.'s analysis)

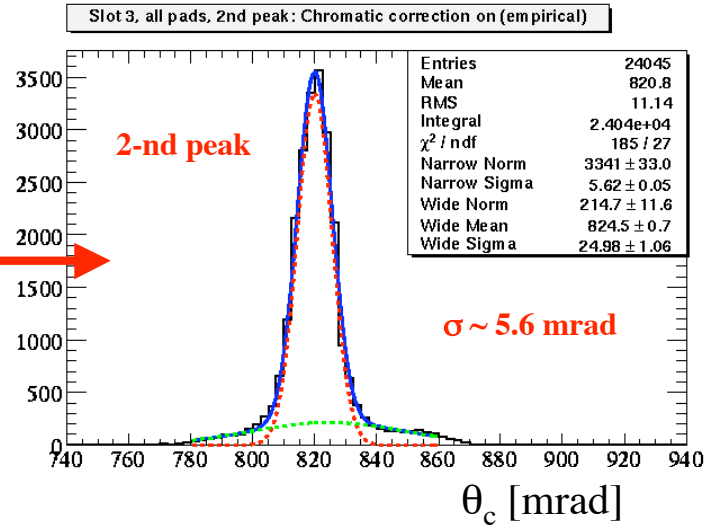
All pixels:





3mm pixels:

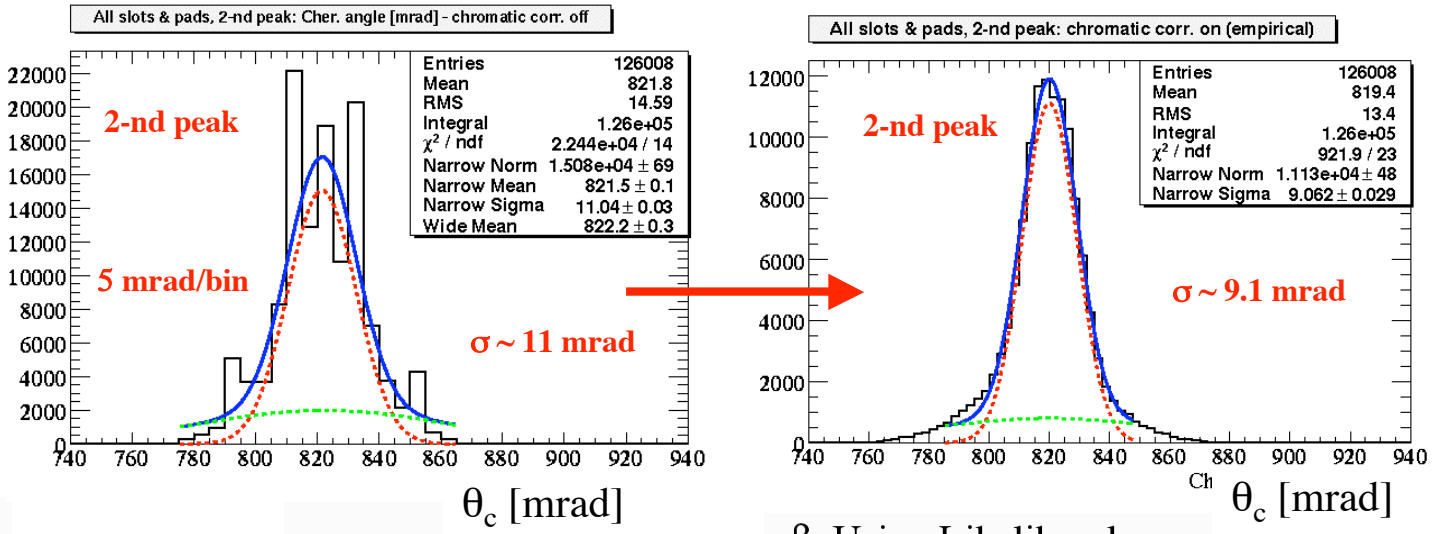




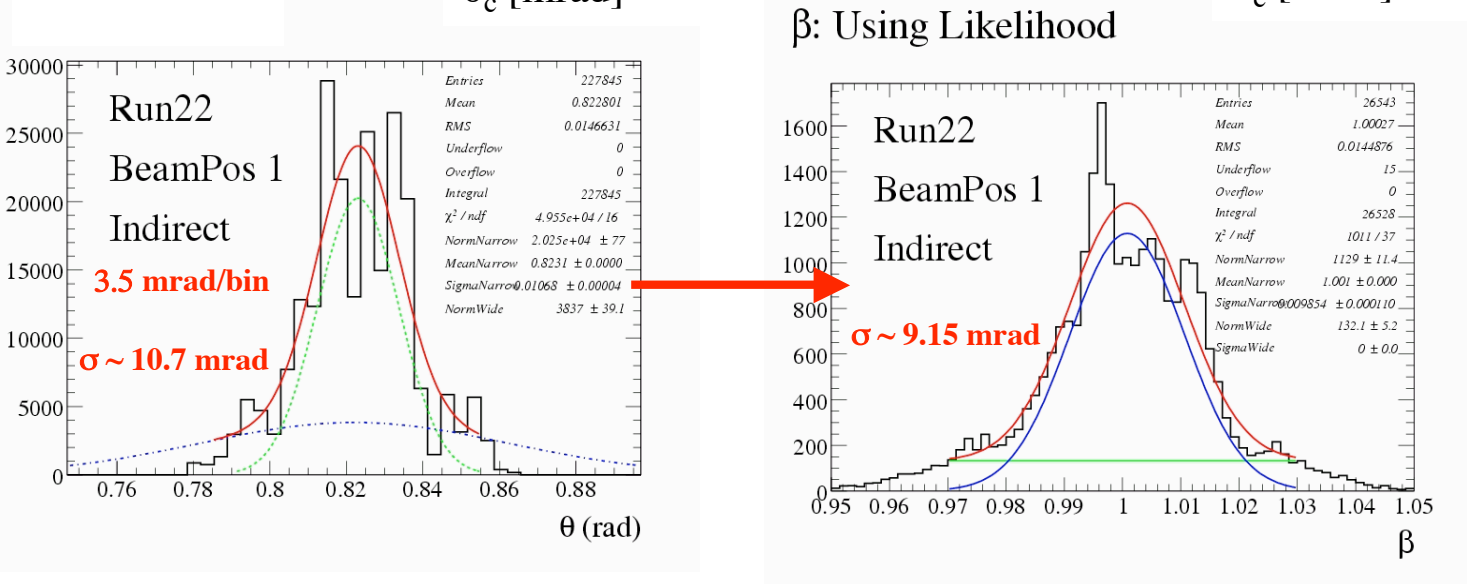
Chromatic correction - pos 1, peak 2, all pixels:

(Comparison of Jose's and J.V.'s analysis)

J.V.:

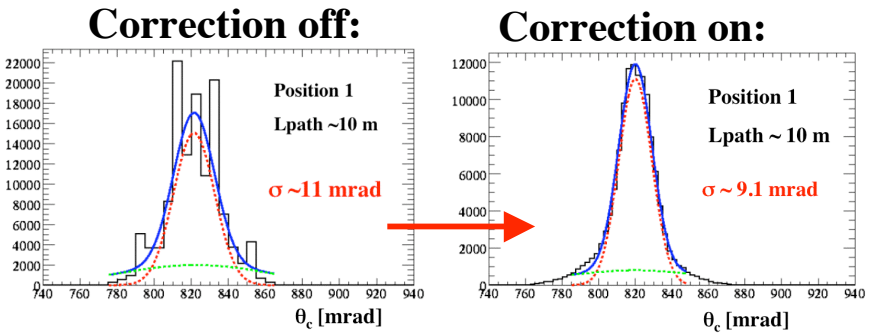


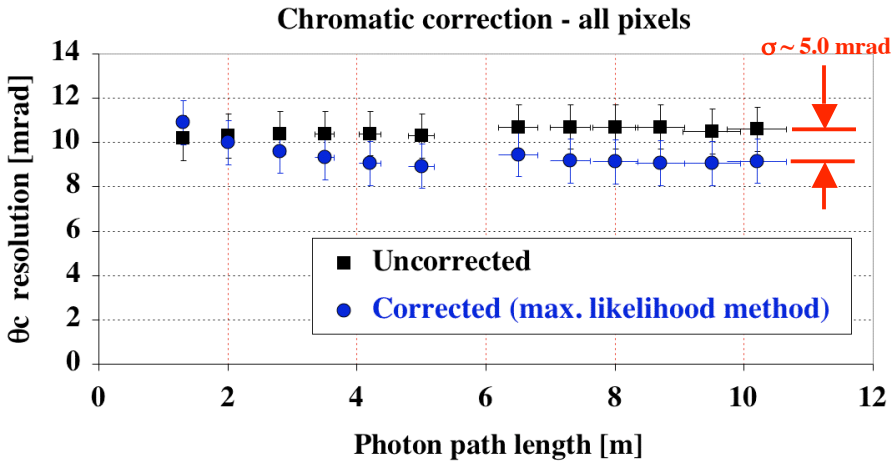
Jose:



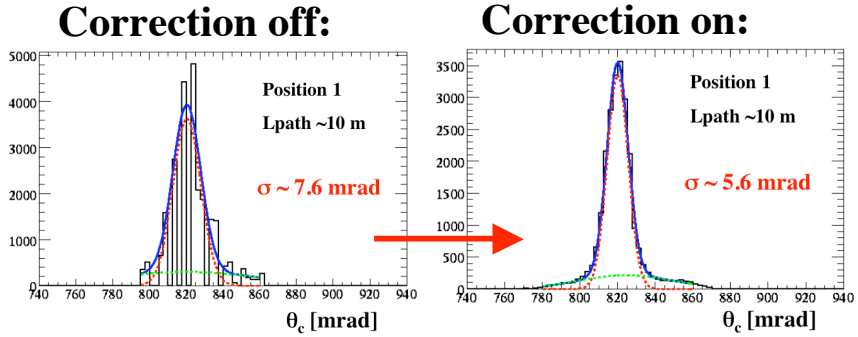
θ_C resolution and Chromatic correction

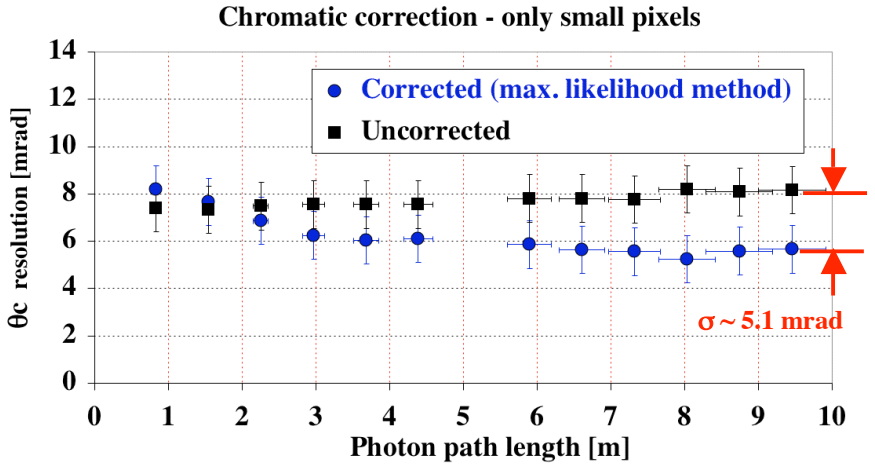
All pixels:





3mm pixels only:

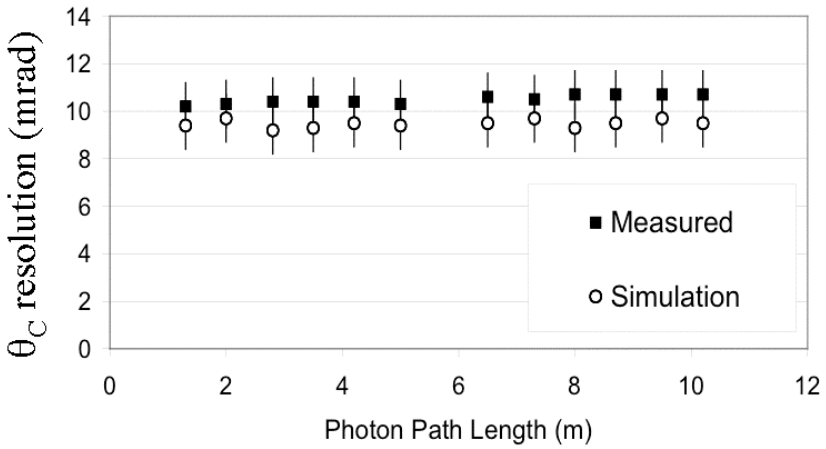




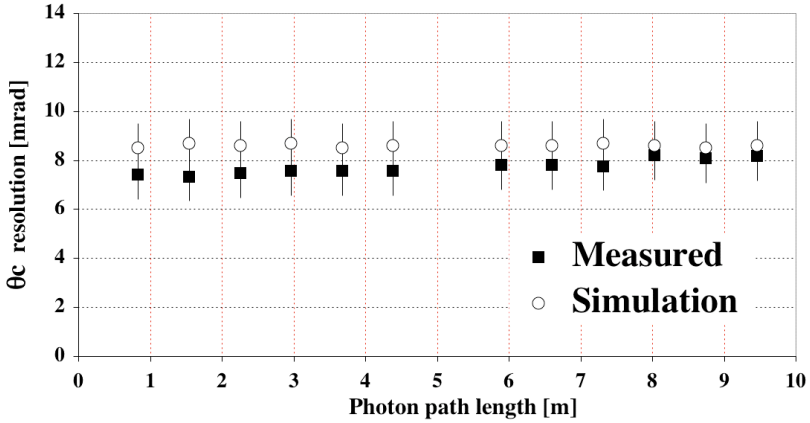
- The chromatic correction starts working for Lpath > 2-3 meters due to a limited timing resolution of the present photon detectors. The maximum likelihood technique does better for short Lpath than other methods
- Holes in the uncorrected distributions are caused by the coarse pixilization, which also tends to worsen the resolution. In the corrected distributions this effect is removed because of the time correction.
- Smaller pixel size (3mm) helps to improve the Cherenkov angle resolution; it is our preferred choice.

θ_C resolution and Geant 4 MC simulation

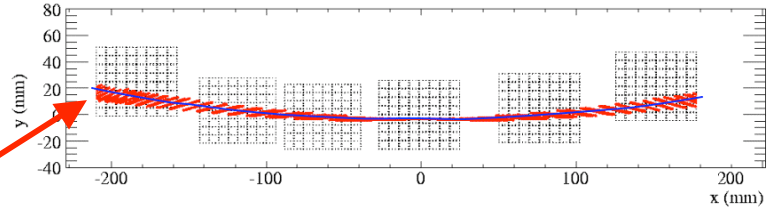
θ_c resolution - all pixels:



θ_c resolution - 3mm pixels only:



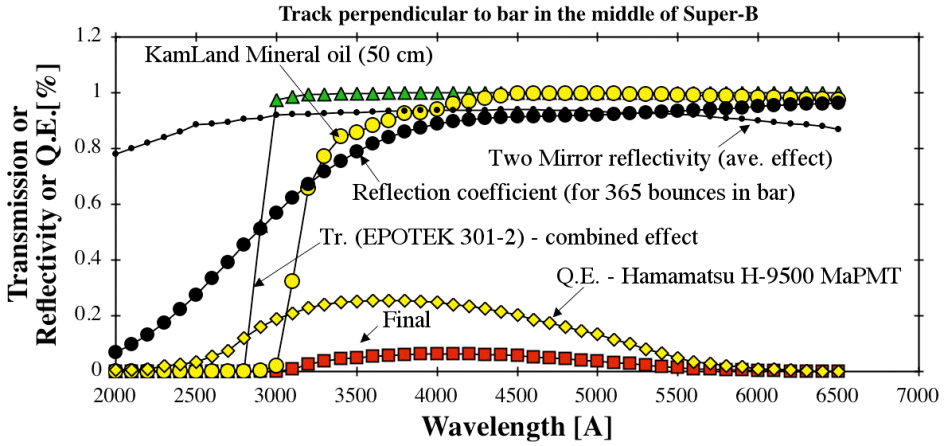
- **Main contributions to the θ_c resolution:**
  - **chromatic smearing: ~ 3-4 mrad**
  - **pixel size: ~5.5 mrad**
  - **optical aberrations of this particular design: grows from 0 mrad at ring center to 9 mrad in outer wings of Cherenkov ring**



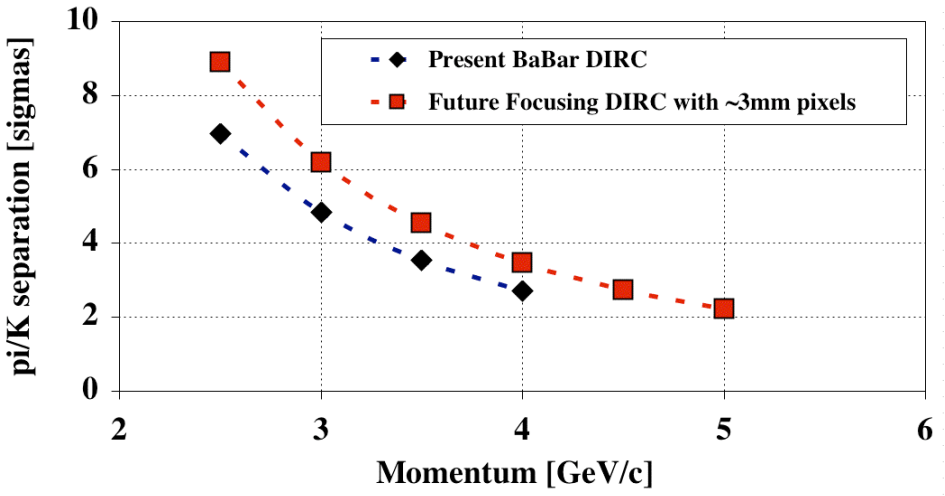
(this effect is caused by the focusing mirror design in the present design)

Expected final performance at incidence angle of 90°

Focusing DIRC prototype bandwidth:



Expected performance of a final device:



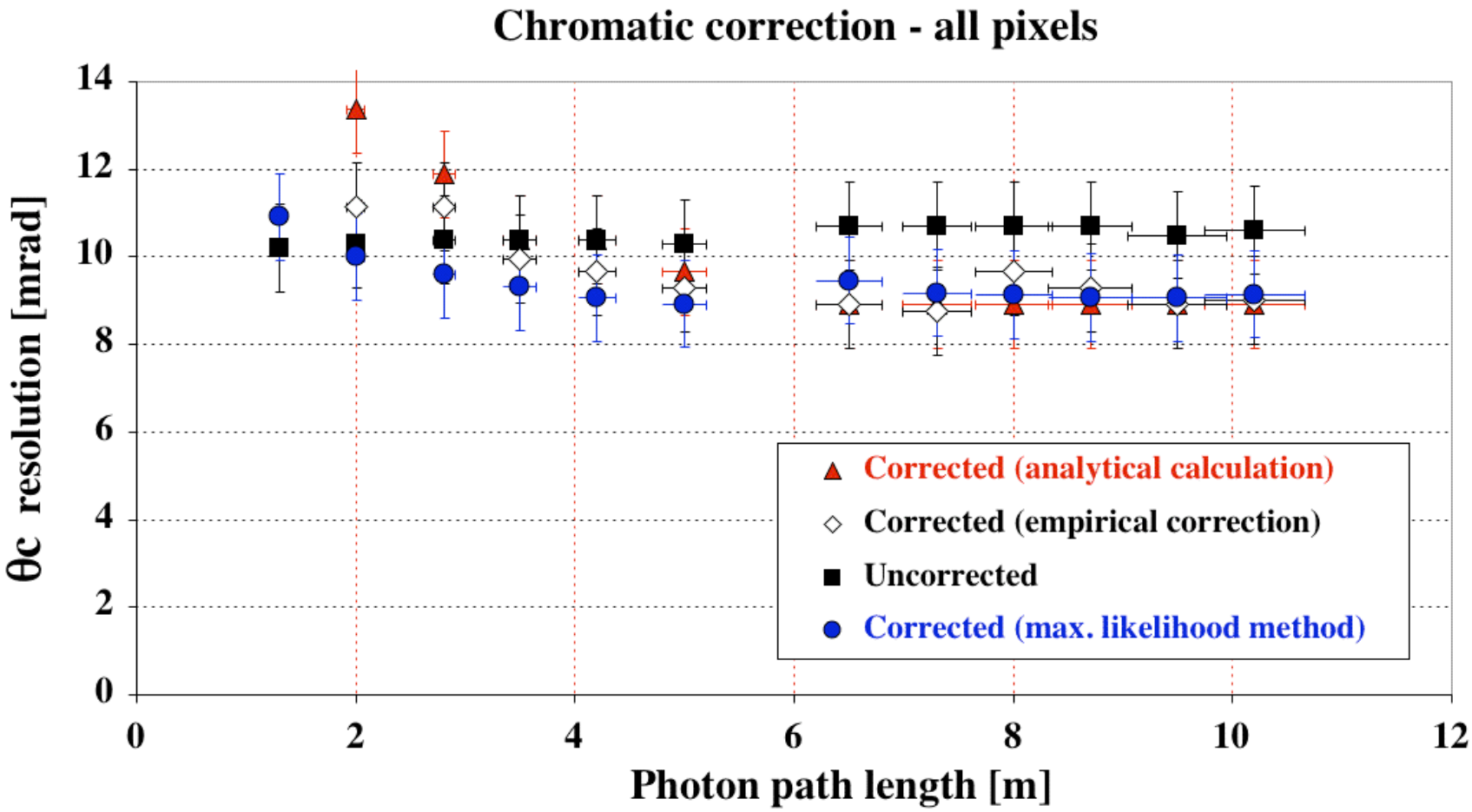
- Prototype's **Npe_measured** and **Npe_expected** are consistent within **~20%.**

- **Hamamatsu H-9500 MaPMTs**:
  We expect **No ~ 31 cm^{-1}**, which in turn gives **Npe ~ 28** for 1.7 cm fused silica, and somewhat better performance in **pi/K** separation than the present BaBar DIRC.

- **Burle-Photonis MCP-PMT:**
  We expect **No ~ 22 cm^{-1}** and **Npe ~ 20** for B = 0kG.

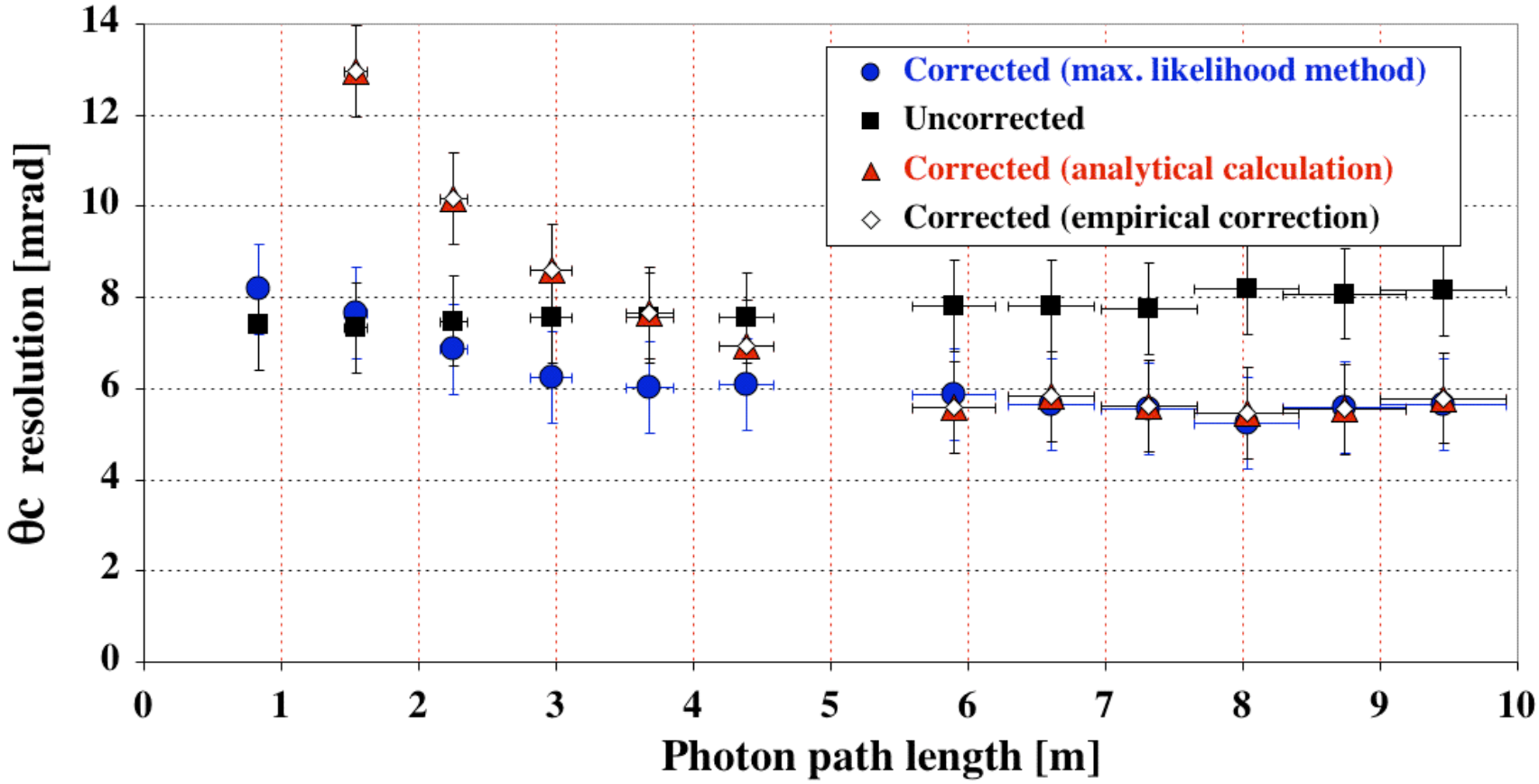
- **BaBar DIRC design**:
  No ~ 30 cm^{-1}, and **Npe ~ 27**.

Chromatic correction - all methods



- **There is a good agreement among various methods for Lpath > 4 meters. For smaller Lpath values the max. likelihod has a best performance.**

Chromatic correction - small pixels only



- **There is a good agreement among various methods for Lpath > 5-6 meters. For smaller Lpath values the max. likelihod performs best.**