How well do we know Vdet geometry ?

Systematic distorsions.

Theory:

- All faces measured to $\simeq$ 1 μm in lab
- With redundency: 4 pts / wafer
- Cross check: wafer size (known $\simeq$ 1 μ
- Thermal effects negligible (water cooling
- Some degrees of freedom frozen
  mainly z wafer position in face.
- Final geometry determined by align^{t}
  procedure at z peak. TPC not used
- Monitored at high energy with laser
  and overlaps (run quality plots)

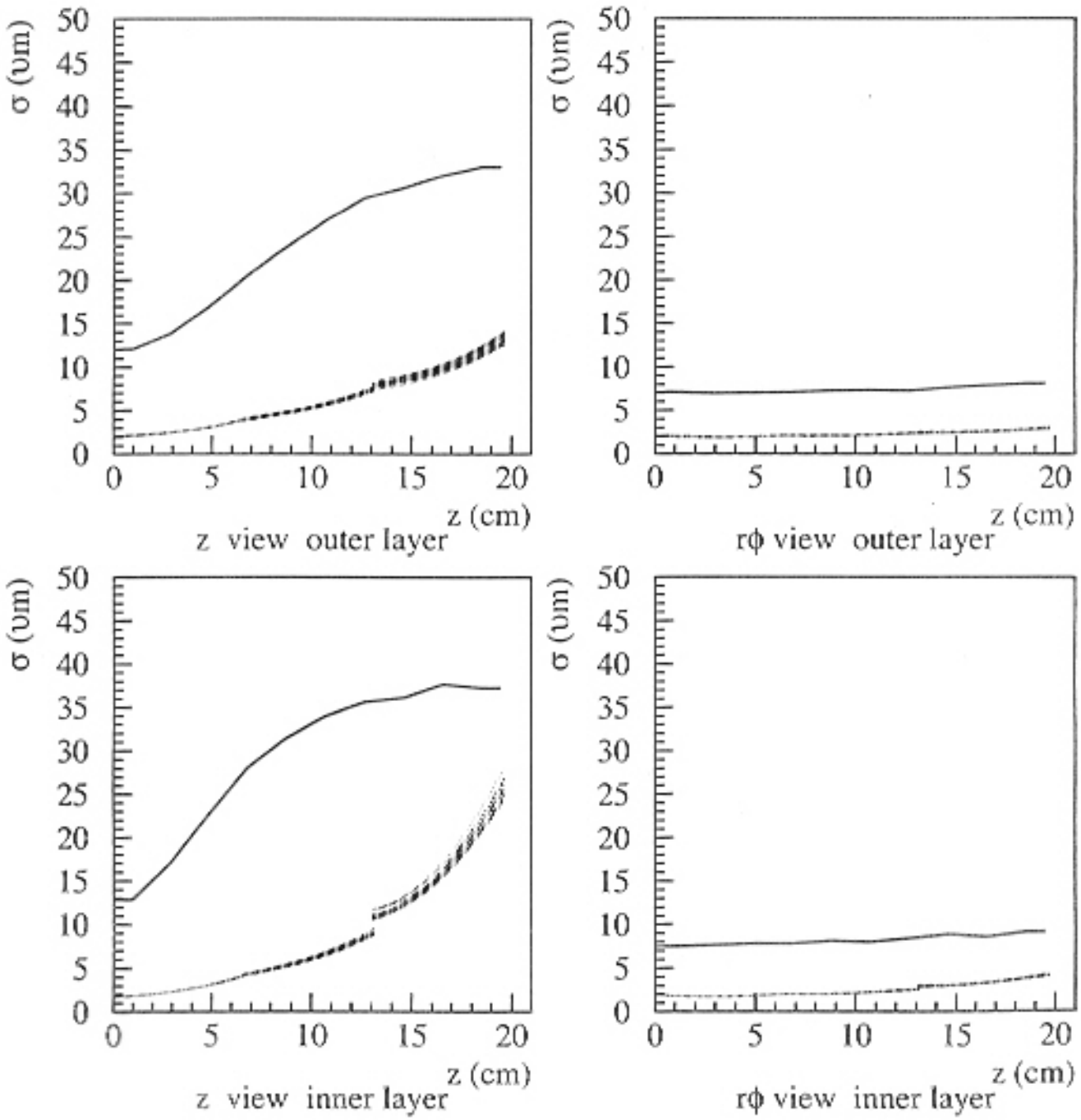


Figure 6: The dotted lines show the alignment errors in both views for all faces as a function of z, obtained from 10 pb^{-1} of 161 GeV data. The solid lines show the intrinsic hit error.

How far can we trust the alignment

- Thermal effects negligible because of
  ~~...absorber - coloring~~
  monitored with laser
  Visible movements seen during fill
  switch on / off

- Humidity effects (change R)
  monitored with overlaps

- Keep in mind that wafers do not change size. Movements are due to differential expansion between suppo and silicon.

Verify with data.

Overlaps

$\delta r\varphi \simeq 0.5\,\delta R$

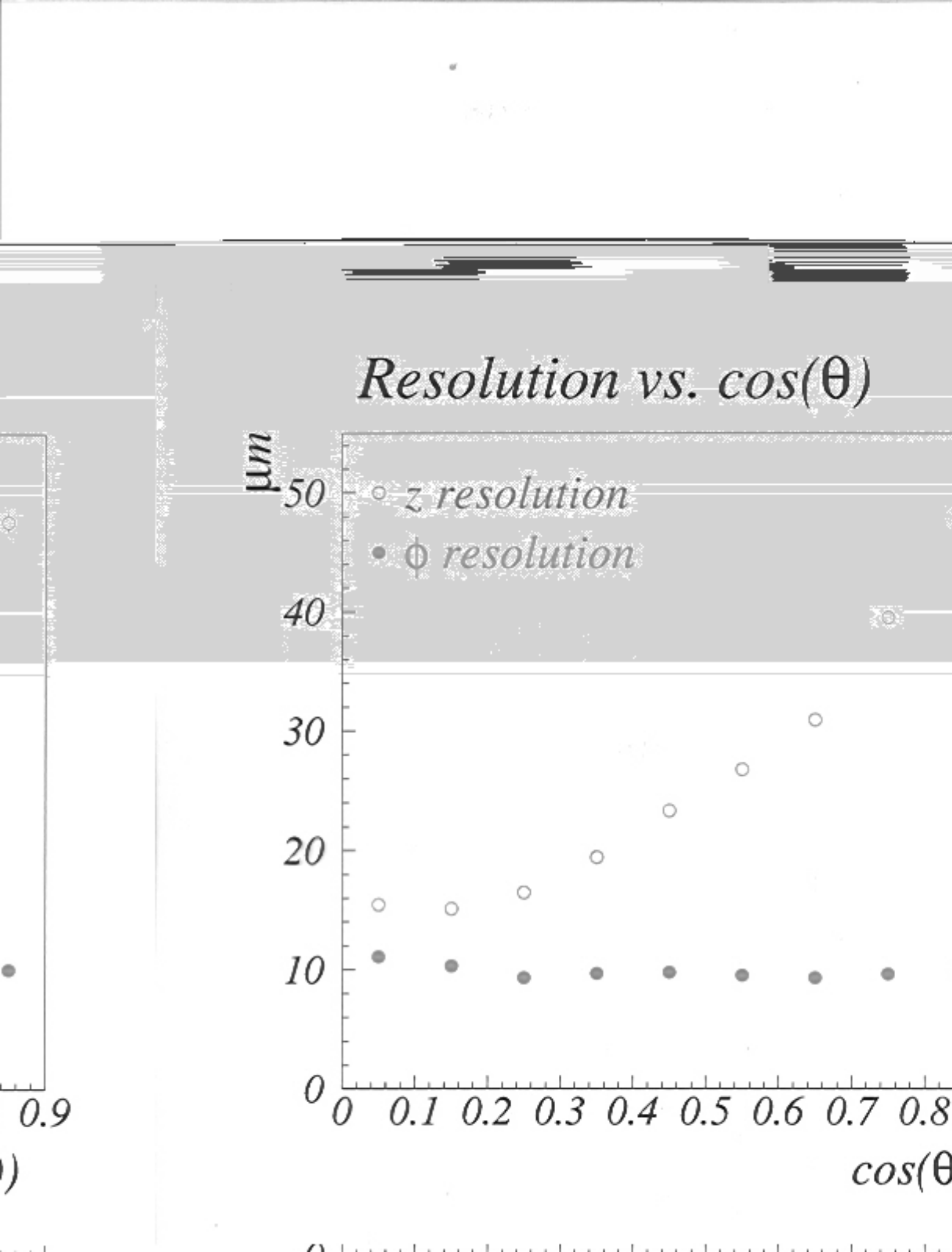
In 1996, humidity in Kevlar R caused bowing of faces $\simeq 100\,\mu m$
Immediately seen, corrected run by run.

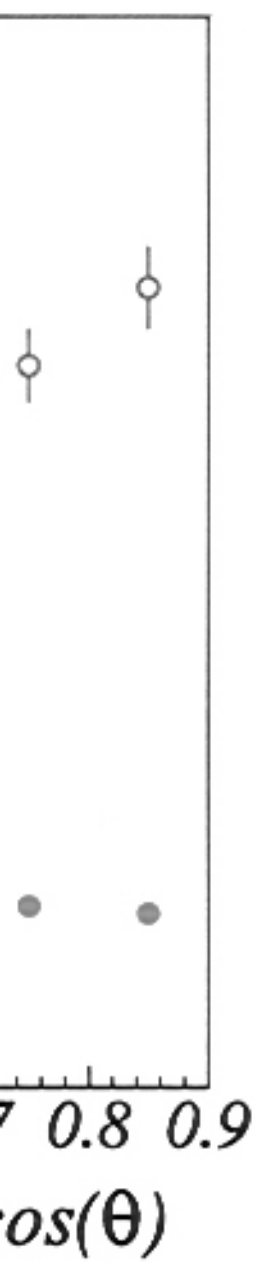
Dimuons Vdet alone

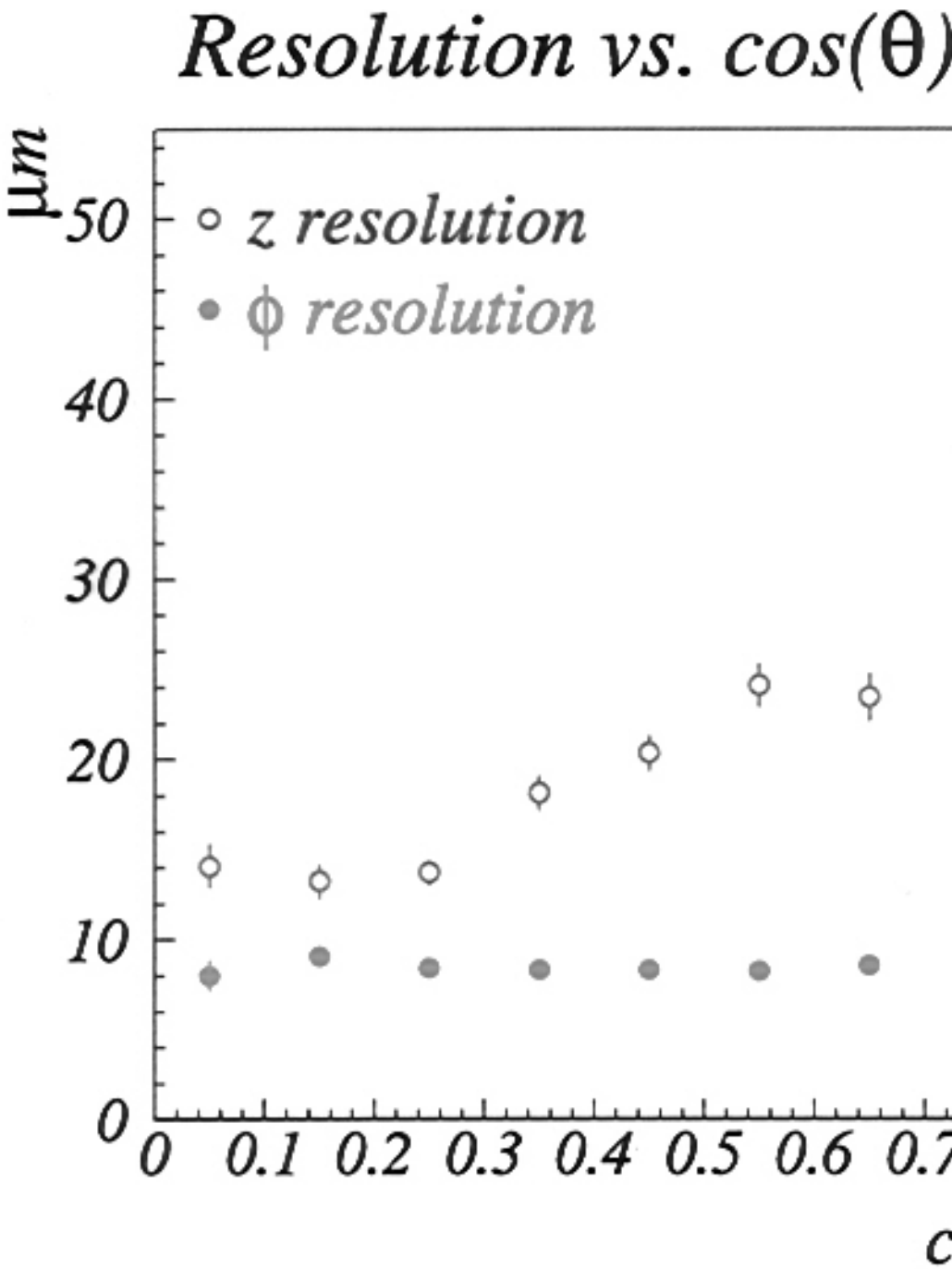
4 hits, 2 tracks

$\Delta z_0 \Rightarrow \sigma_z$

$\Sigma d_0 \Rightarrow \sigma_{r\varphi}$


Resolution vs. cos(θ)
μm
z resolution
ϕ resolution
50
40
30
20
10
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
cos(θ
0.9


0.8
0.9
os(θ)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Conclusion

Vdet geometry is probably accurate to $\simeq 10\ \mu m$.

Deviations by 100 μm or more are extremely unlikely

Note: $100\ \mu m / 10\ cm = 10^{-3}$ rad.