



Bows or Kinks ?

C. Kleinwort

DESY/HH alignment chat 23.03.10

Alignables

- ★ Now

- ▶ Flat modules (units)

- ★ Surface geometry $w(u,v)$

- ▶ Module, sensor curvature !

- ♦ Biggest effect and surprise: Large sagittas ($S_v \sim 60\mu\text{m}$) in TOB on module (2 sensors in v), but not on sensor level

- ▶ Inter sensor misalignment ?

- ♦ Kinks in v between the sensors of the TOB modules

- ★ Logical step

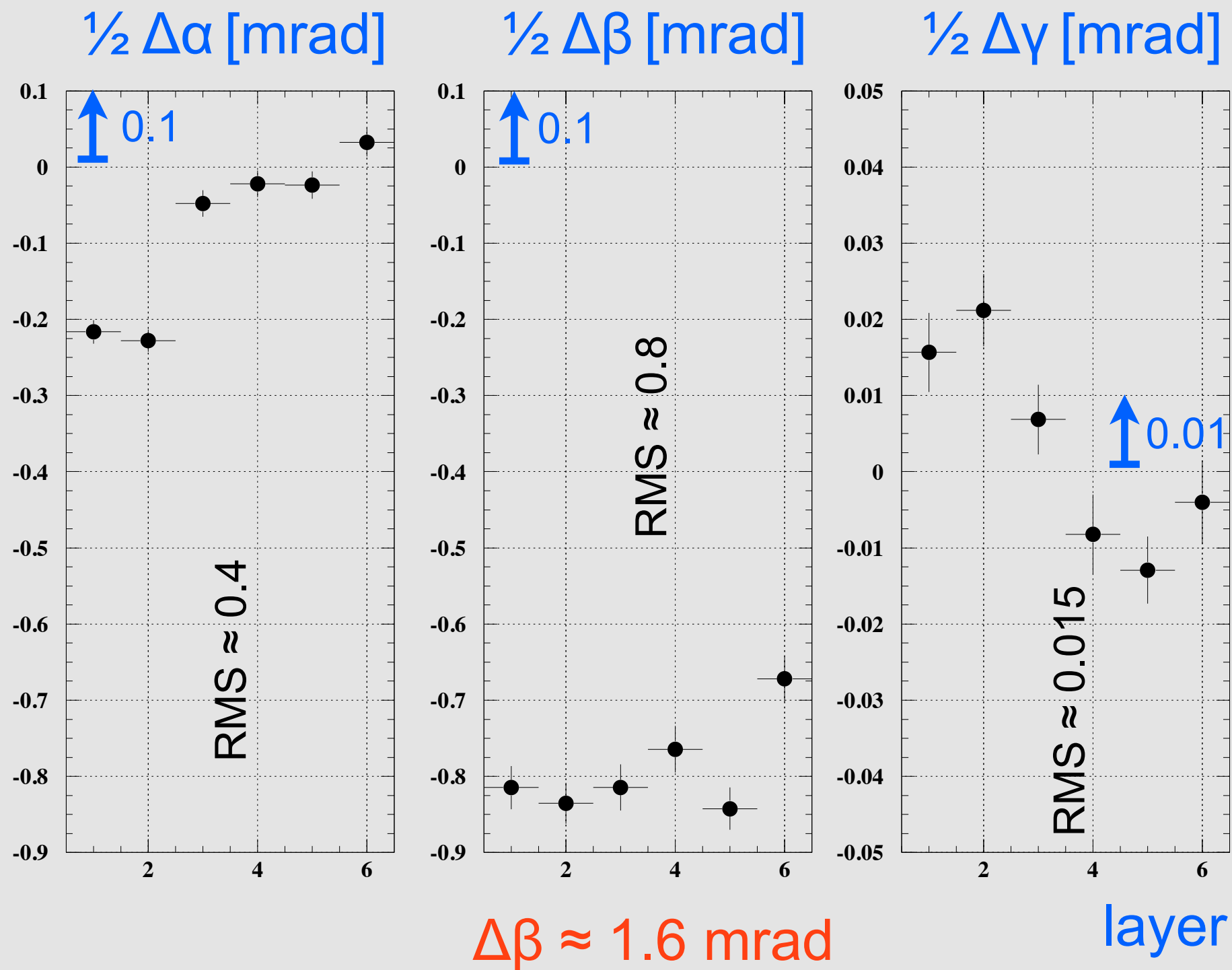
- ▶ Move to curved sensors

Cosmics

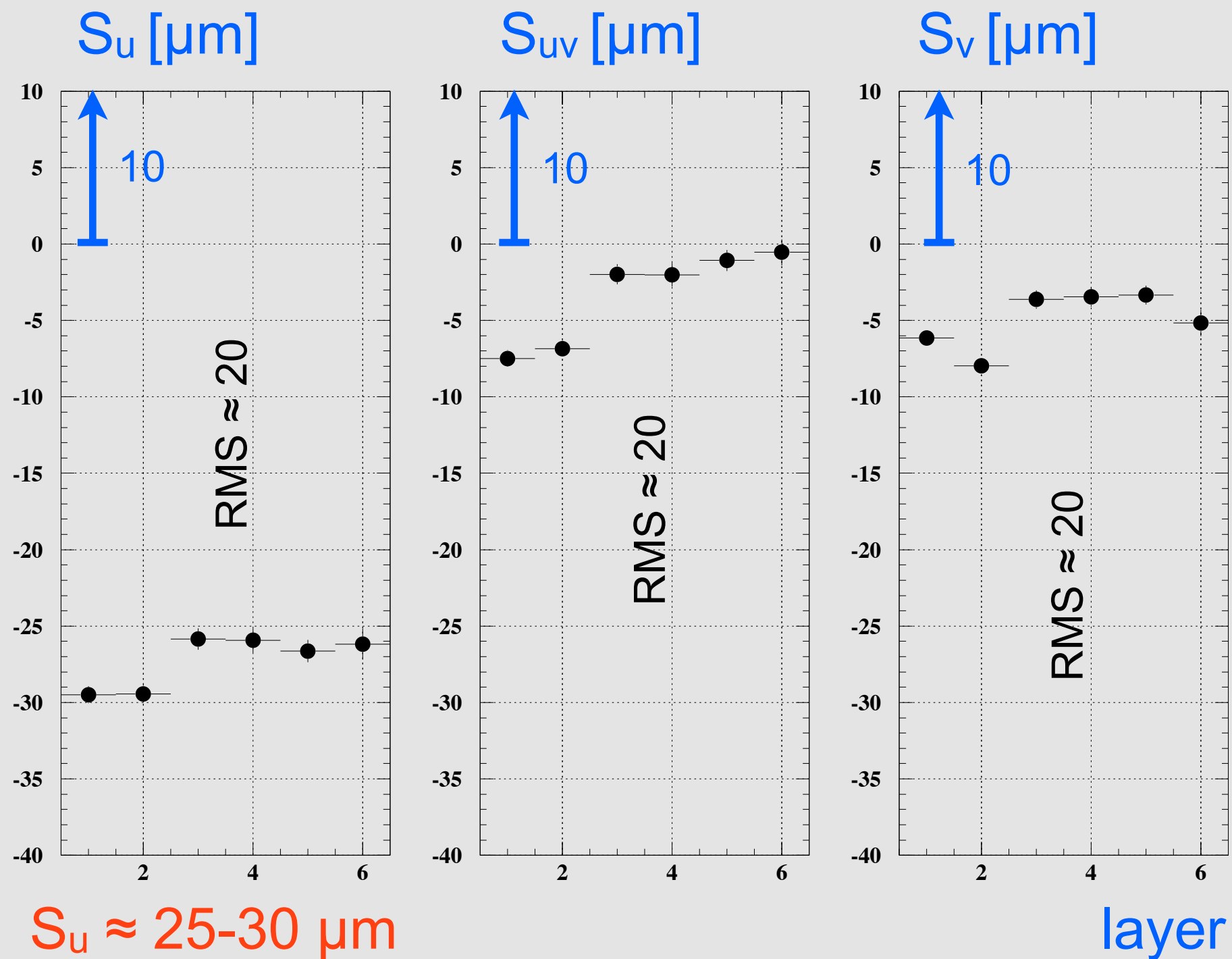
★ CRAFT09 data

- ▶ CMSSW_3_4_1
- ▶ Barrel modules (PXB, TIB, TOB)
- ▶ Fit modules as curved sensors with MP (200k tr.)
 - ✦ PXB, TIB: module = sensor
 - ✦ TOB: module = 2 sensors
 - ✦ Sensor parameters: $u, (v), w, \alpha, \beta, \gamma, S_u, S_{uv}, S_v$
- ▶ Validate with independent sample (100k tracks)
 - ✦ χ^2 of track fit in MP (broken lines, no APE, default CPE)
- ▶ Contribution to hit error: $\sigma_w \cdot \tan(\alpha), \alpha \sim d_0/R_{\text{hit}}$

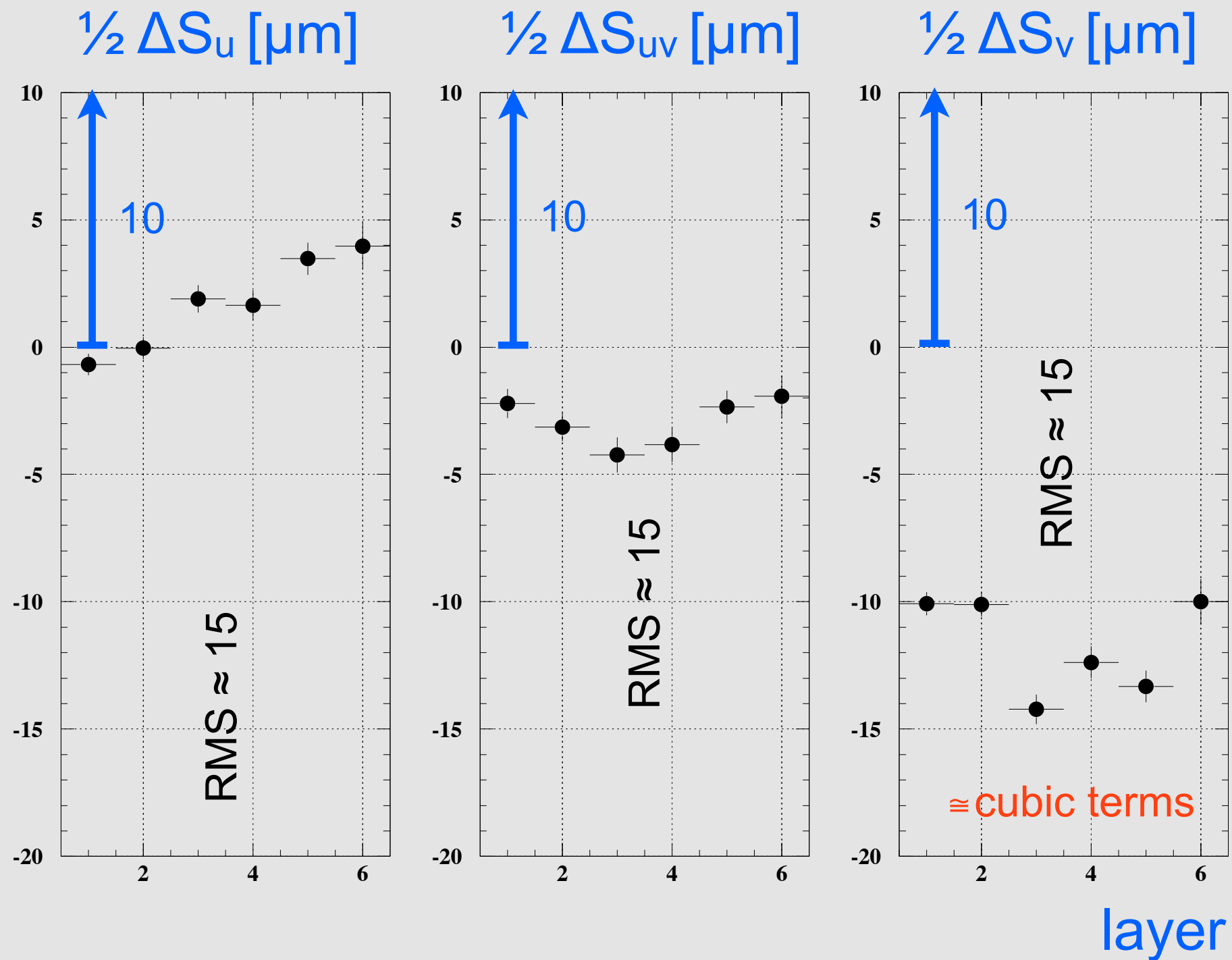
TOB, angular differences



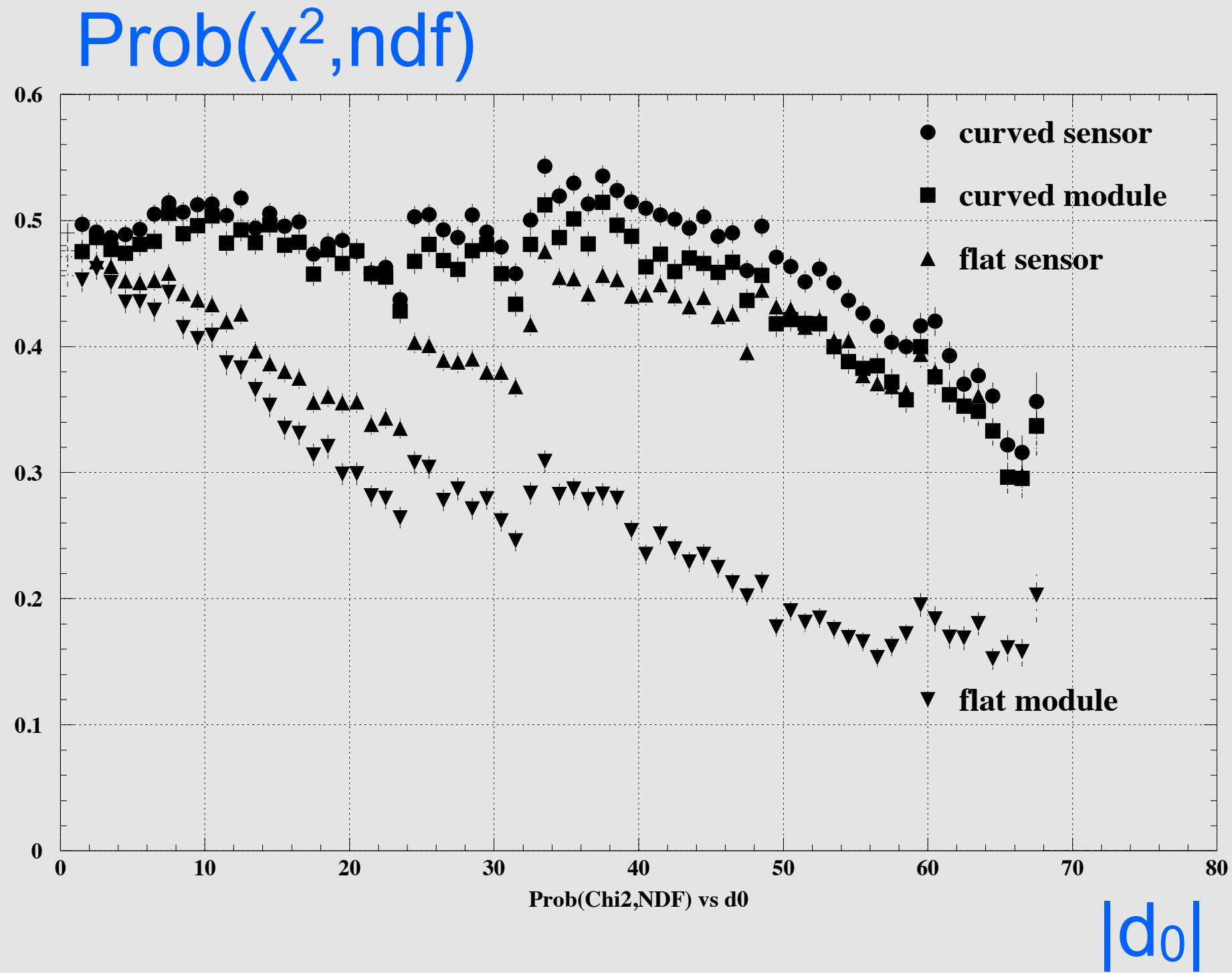
TOB, sagitta averages



TOB, sagitta differences



Track fit



χ^2/ndf

1.09

1.12

1.22

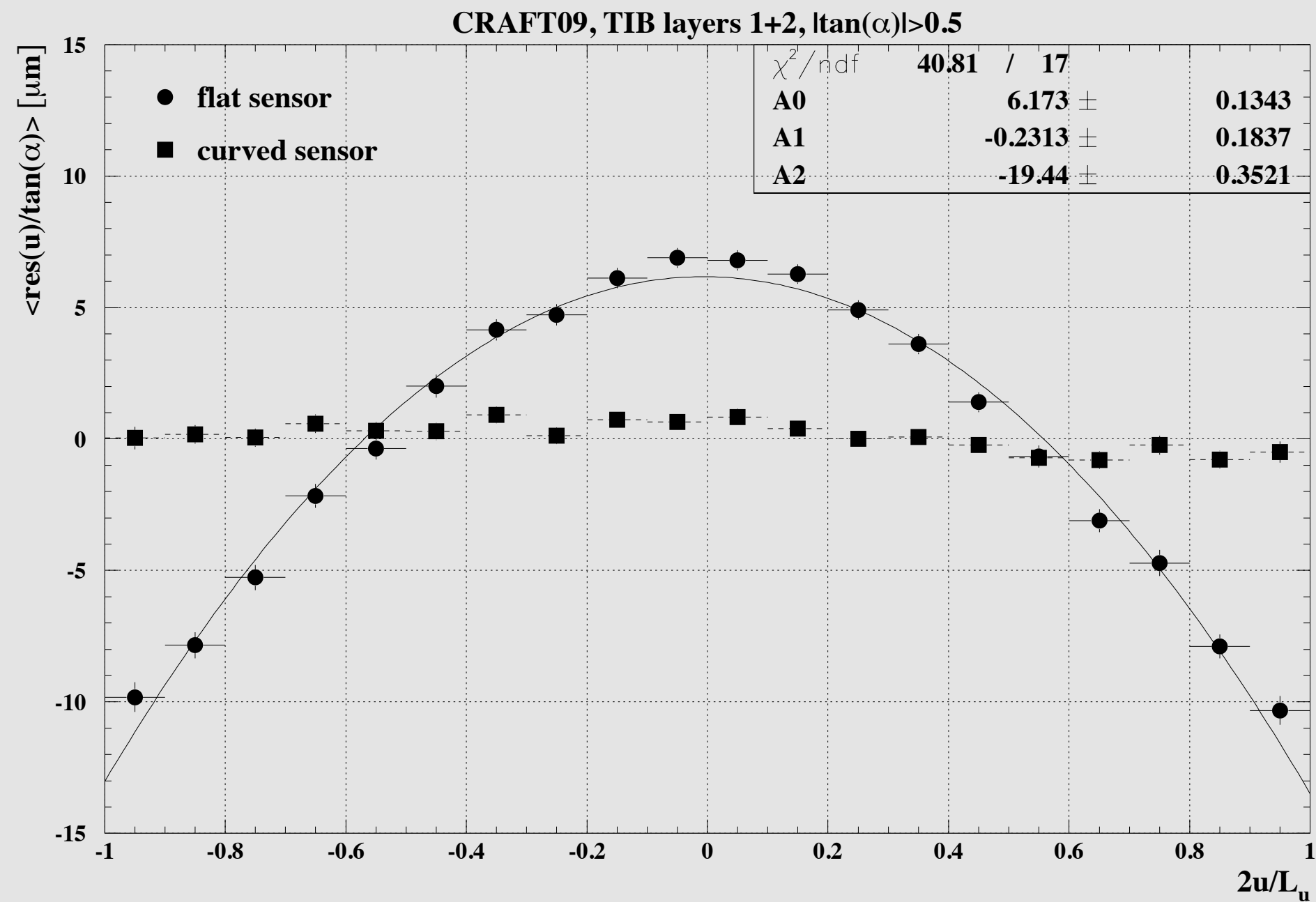
1.44

Summary

- ★ Bows or Kinks: **BOTH**
- ★ **Curved sensors** are the appropriate alignables
 - 200k (24244*8) instead of 75k (15148*5) for SST
- ★ Kinks should be accessible for HIP
- ★ I'm done with cosmics
 - $\chi^2/\text{ndf} \sim 1$ with curved sensors

Backup

Biased residuals TIB: Δw vs u_r



Biased residuals TOB: Δw vs v_r

