Detector Acceptance at an Asymmetric Z-Factory

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DESY

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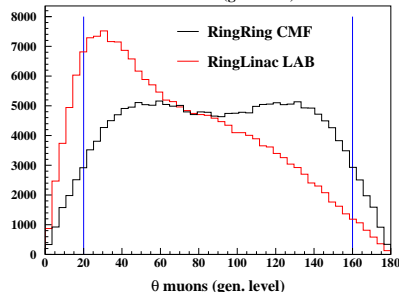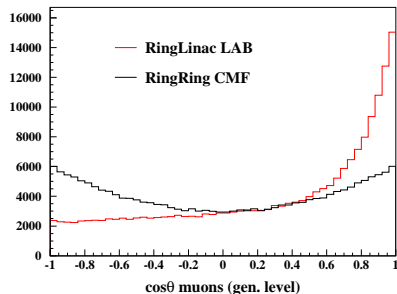## Very crude look

…using:

- Pythia 6.2 for $e^+e^- \rightarrow \mu^+\mu^-$
    - incl. ISR/FSR, but
    - no Beamstrahlung
    - no polarisation
    - no other beam parameter
- 10^5 events each for RR (45.6/45.6) and RL (27.7/75)
- fast sim of ILD detector: SGV
    - full ILD acceptance (RR)
    - ILD at RR, but only $20° < \theta < 160°$
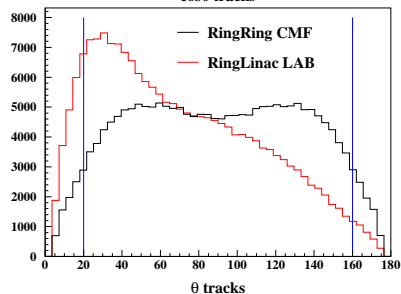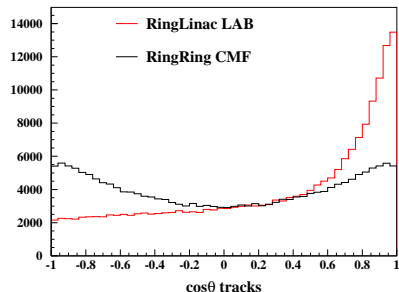   - ILD at RL, $20° < \theta < 160°$

Muons at Generator Level

- $\cos\theta$, θ
- RL: acceptance asymmetric (of course :-)
- distribution very steep on one side
- $\Rightarrow$ need to know acceptance extremely well (quantify!)
- shape will depend strongly on exact beam energies
- $\Rightarrow$ how well will we know them?

Reconstructed Tracks
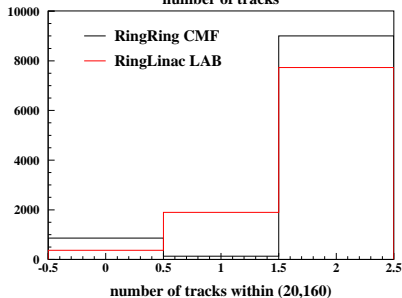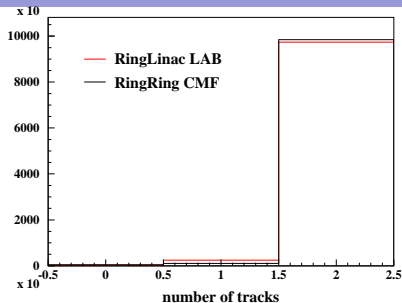
- $\cos\theta$, θ
- just to show it works :-)

Number of events with both μ tracks seen

- RR, full ILD: 98.4%
- RR, (20,160): 90.0%
- RL, (20,160): 77.3%

$\Rightarrow$ **acceptance loss not dramatic, probably (over) compensated by higher polarisation in RL**
BUT: systematics of acceptance / efficiencies worrysome?

Summary & Outlook

Summary

▶ first look with Pythia / SGV

▶ loss of acceptance in LR probably compensated by higher polarisation

▶ BUT: systematics - detector as well as beam energies!

Outlook

▶ quantify requirements on beam energy precision and acceptance / efficiency knowledge

▶ more realistic beam parameters → Whizard ?

▶ look at other physics channels