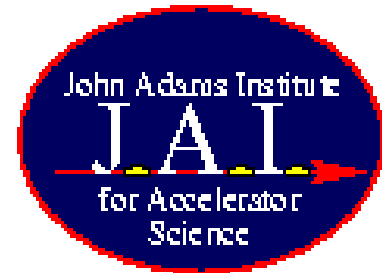


Detection of Laser Wire photons in the ILC polarimeter chicane



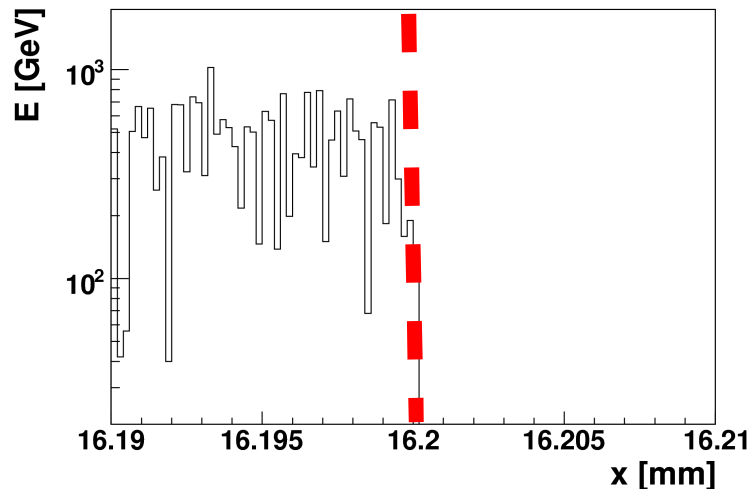
**Lawrence Deacon,
Grahame Blair RHUL**



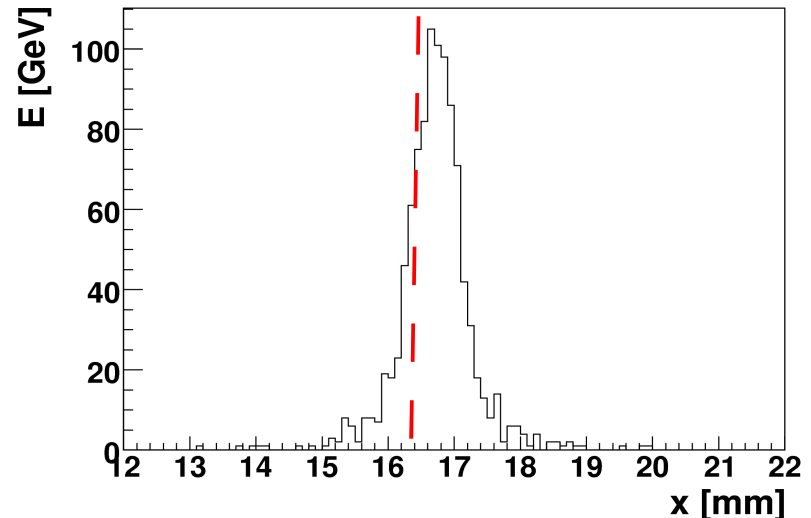
**Workshop on Polarisation and Energy
Measurement, DESY Zeuten 10th April 2008**

Solution 1

- Angular spread of LW Compton photons = 6.9 mrad
- Distance from LW IP to LW detector ~ 90 m
- Position spread of LW Compton photons at detector = 550 μm



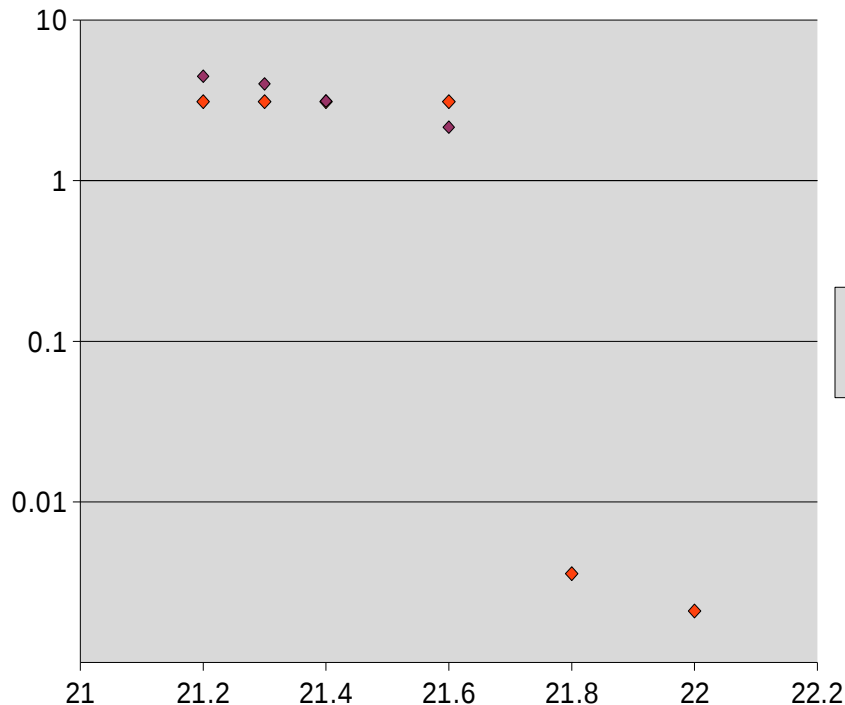
Simulated SR distribution from chicane dipole



Simulated LW Compton photon distribution

Simulation

- 1cm thick, 1cm wide, 2cm tall piece of lead inserted into beam
- SR and LW electrons/positrons above Cerenkov threshold 9.25 MeV after converter counted
- **Preliminary** results below look promising – need to get more data points esp. between 21.6 and 21.8 and to compute errors

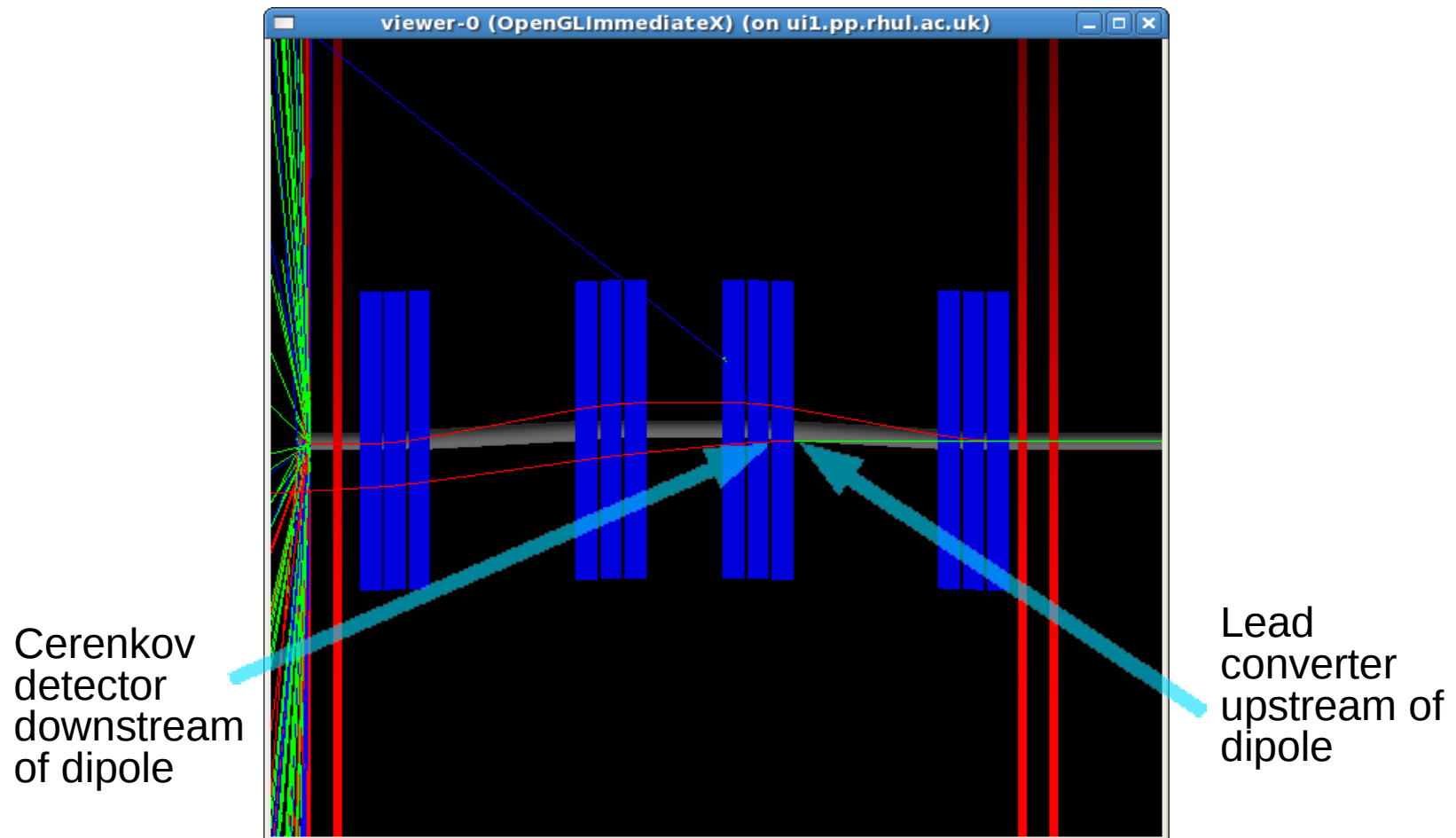


x axis: number of e+ e- after converter

y axis: distance of centre of piece of lead from 250GeV beam line in mm

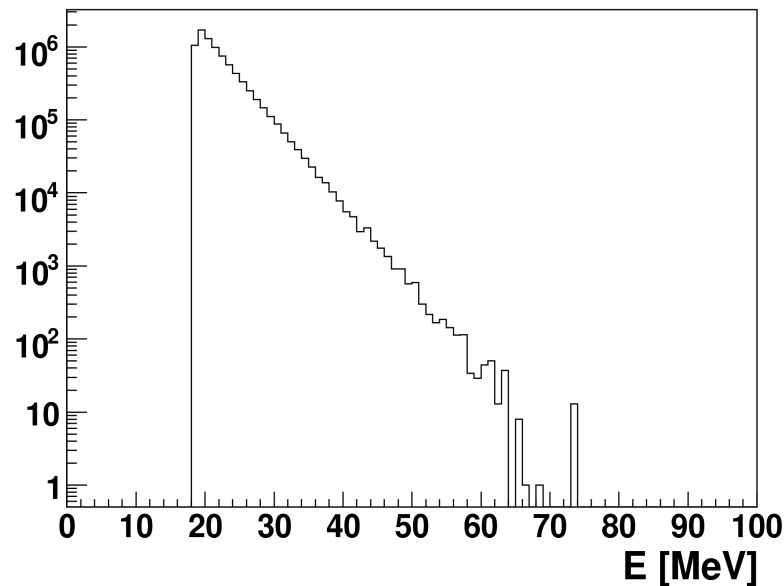
Solution 2

- Separate converter and Cerenkov detector with a dipole field



Solution 2

- SR photon energy low compared to LW, and produces low energy e^+ and e^- in the converter
- These are moved to the sides by the dipole field but some of the LW signal gets through



Generated SR spectrum

Solution 2 - results so far

- Signal to synchrotron background ratio with original configuration is **0.025** (similar to analytical estimate).
- In new configuration, with present statistics gathered, LW signal after first dipole **0** so can only put lower limit on signal/background
- Signal/background using **solution 2 only is greater than 8**

Conclusions and Outlook

- So far looks encouraging for laser wire photon detection in the ILC polarimeter chicane.
- More statistics are required but we are close to an answer
- Firstly need to find optimum converter thickness in new scheme – will take ~ 1 day
- Estimate ~ few days computing time on RHUL grid farm needed to increase lower limit on S/N by factor of ~**100**.
- Halo background?