

Scintillator Tests for the Cosmic Pixel Test

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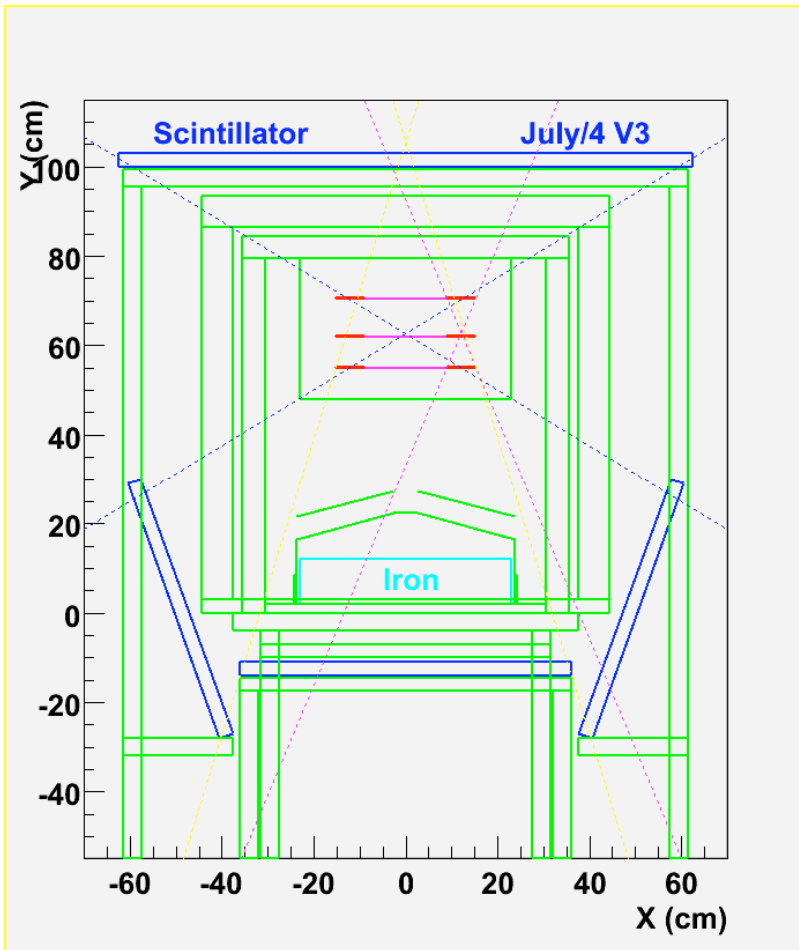


Introduction

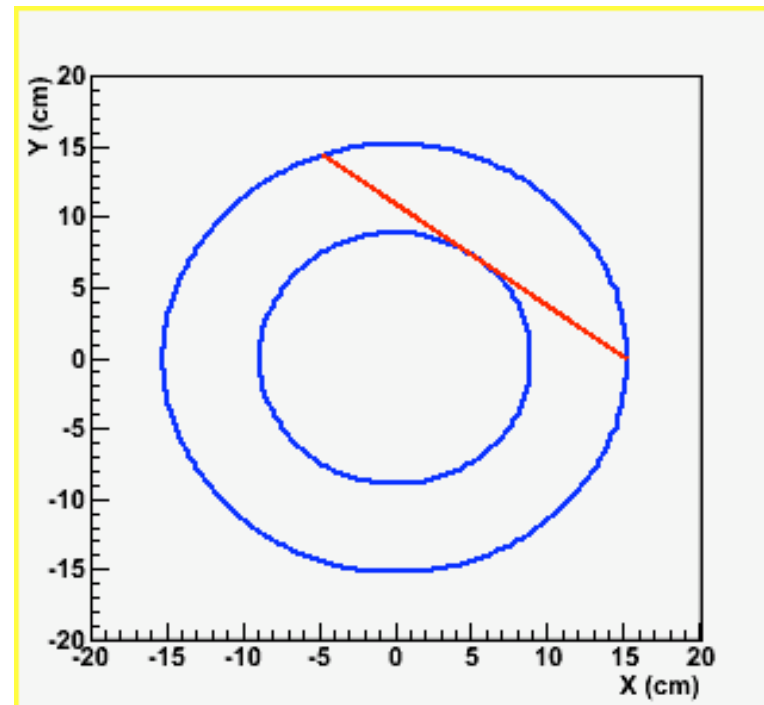
- Align the pixel detector with cosmic rays
- Need scintillators as triggers
 - ‘Recycling’ trigger detectors from E143
 - Must test before shipping to CERN

Test Geometry

XY Projection

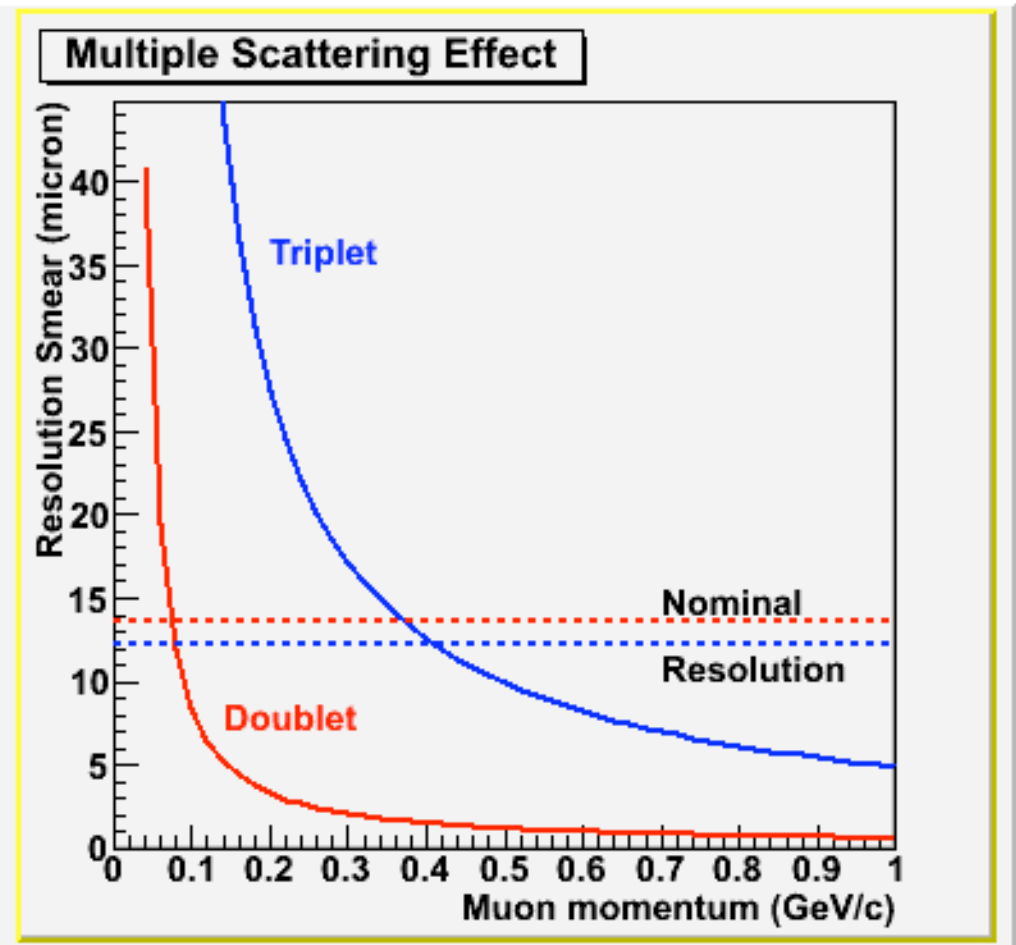
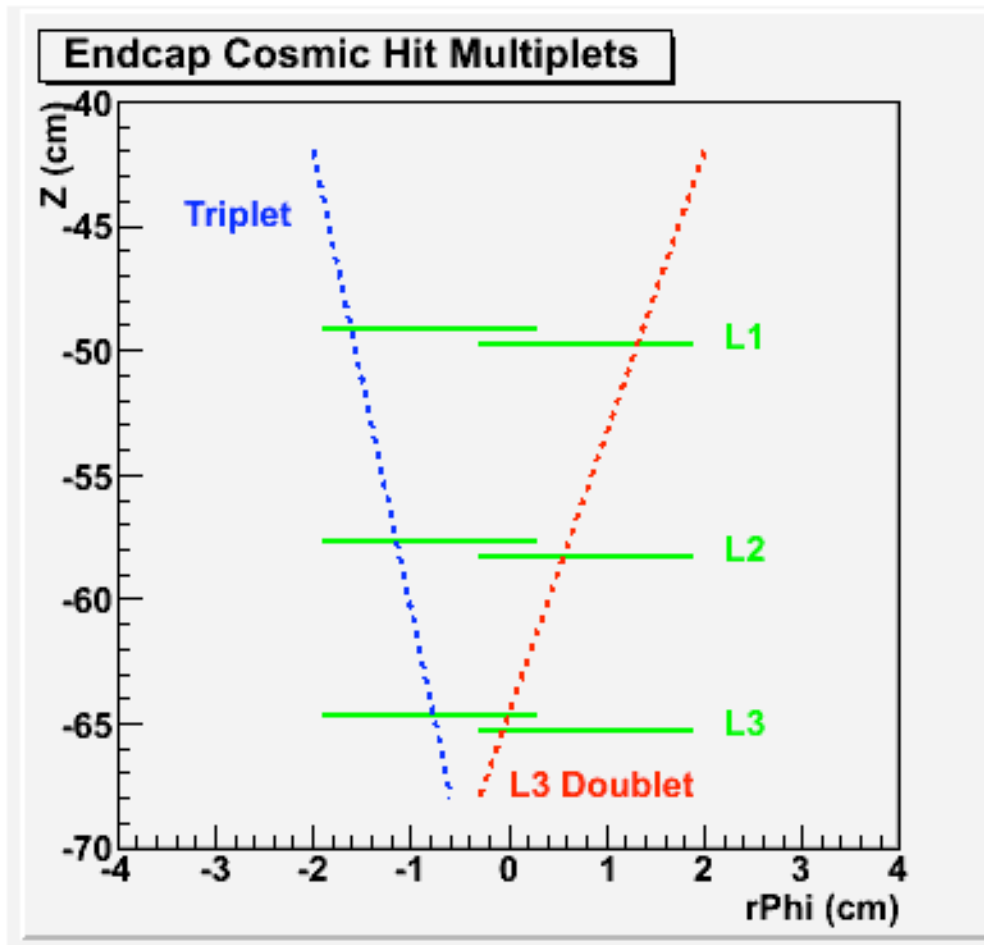


Pixel Rings

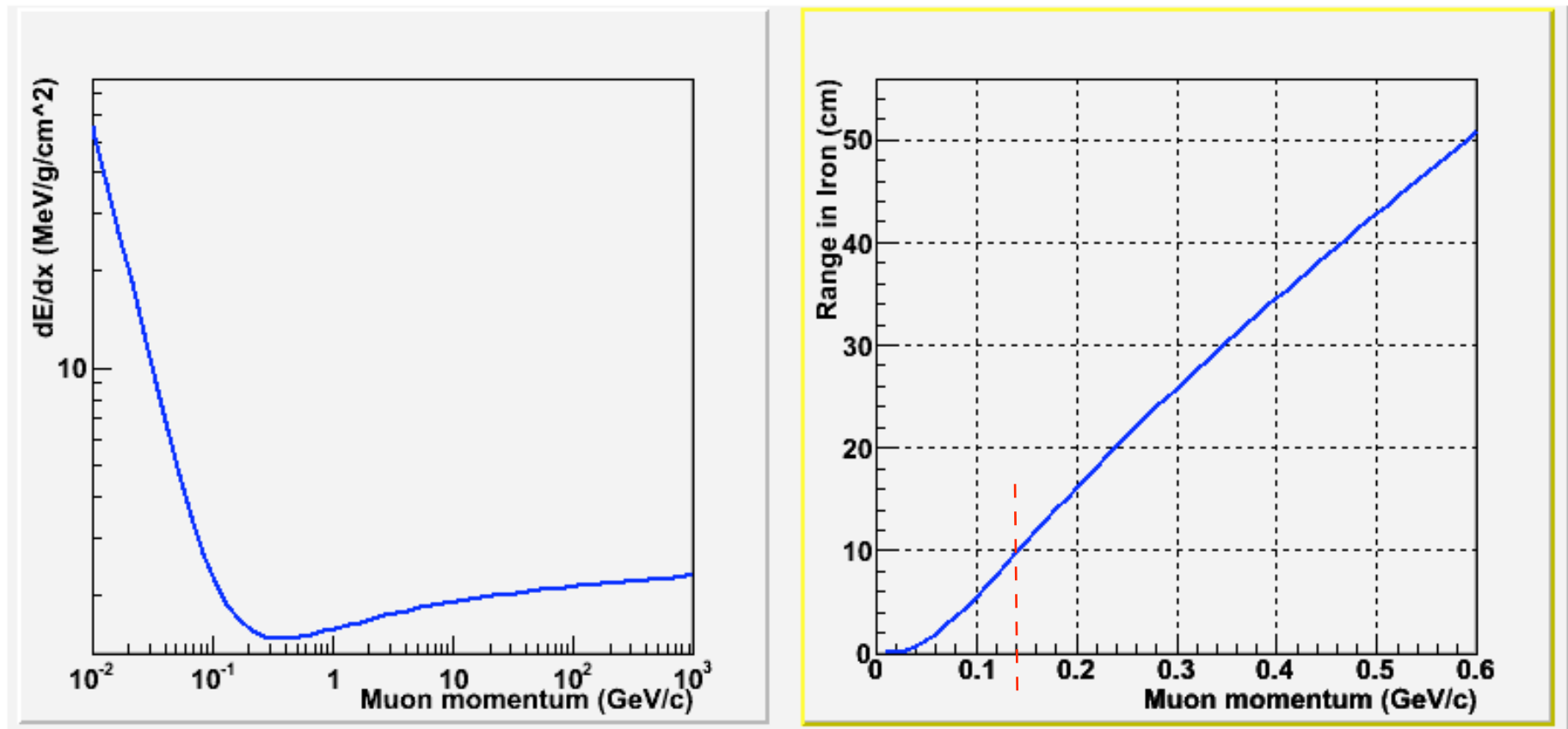


Multiple Scattering

- Multiple scattering of low energy muons smears the position resolution
- No B field \Rightarrow Can't neglect low momentum muons



Introduce Iron Block



- Iron effectively filters out low momentum muons

Scintillator Tests

- Recycling the scintillator triggers from E143
 - 2 **big** scintillators (2 **PMTs**)
 - 2 **small** scintillators (4 **PMTs**)
- Ensure PMTs still work
- Lack of electronics!



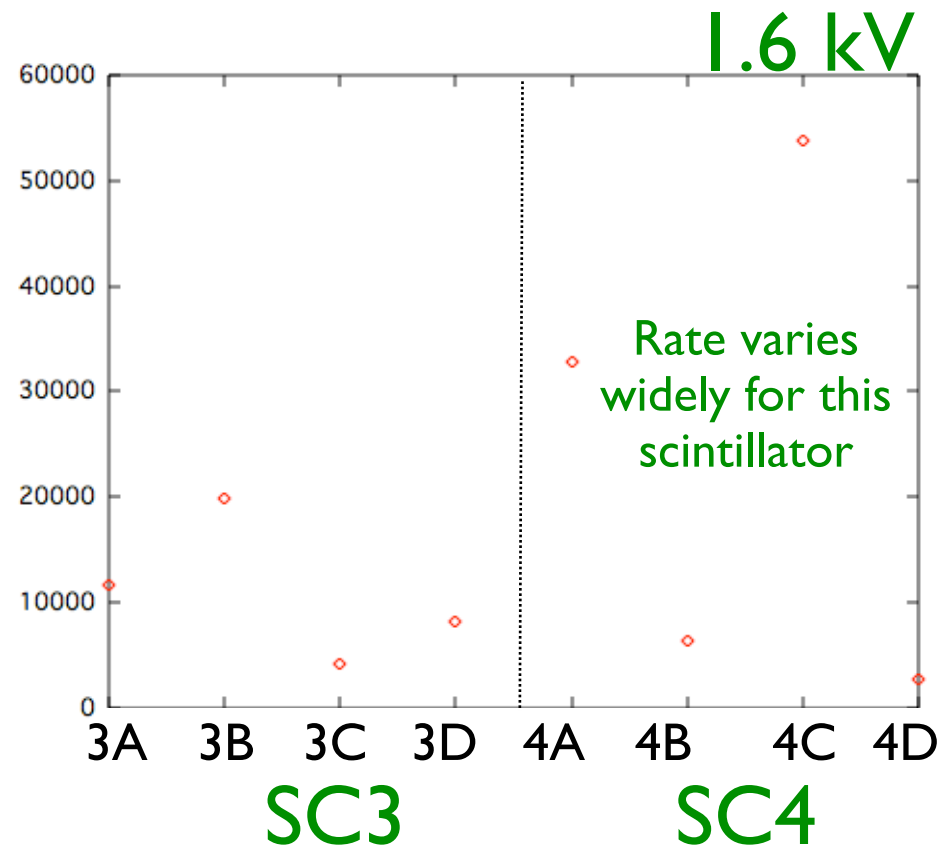
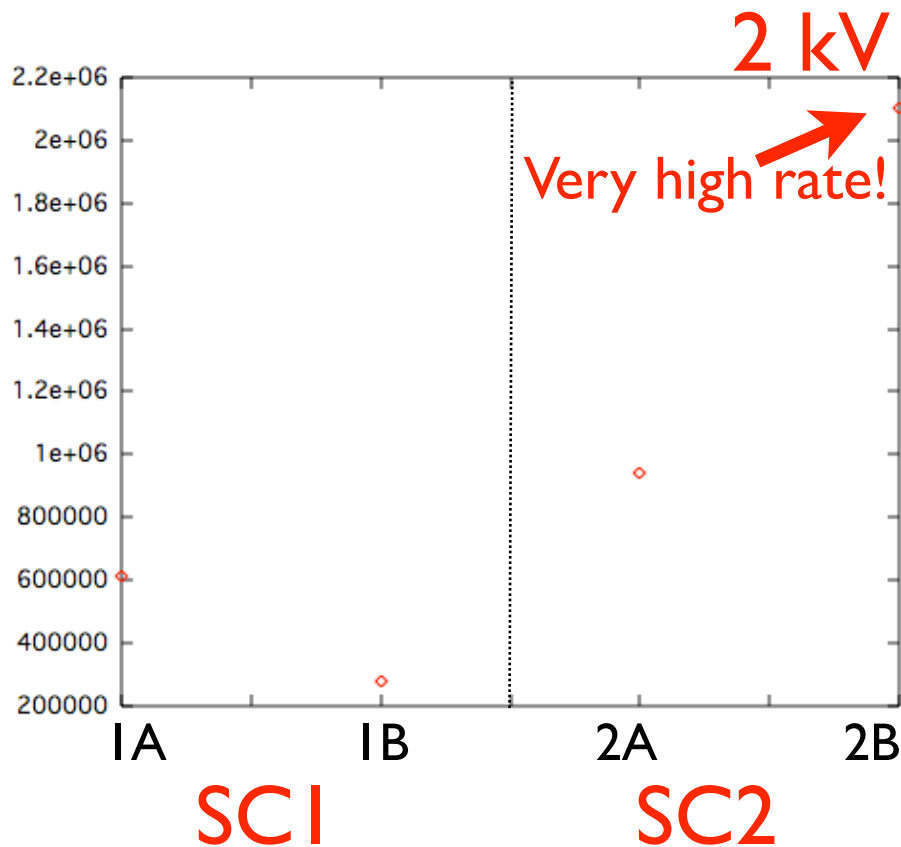
Tests

- Check all PMTs work
- Compare singles rate with a nominal threshold (25 mV)
- Measure PMT efficiency with varying high voltage



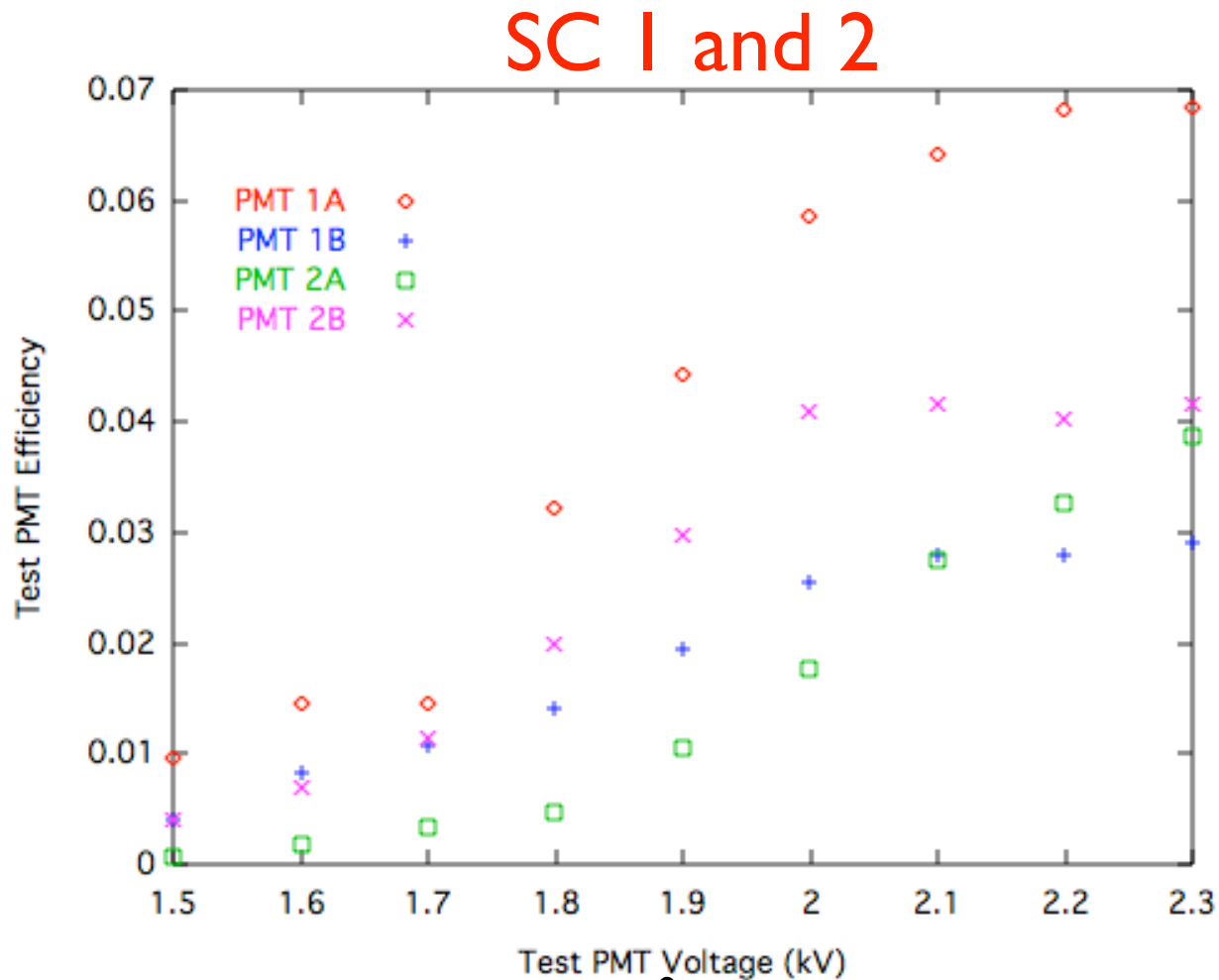
Singles Rate

- Signals from an individual PMT during 30 s
- Run at operating voltage with a 25 mV threshold
- Widely varying rate!



Big Scintillator Efficiency

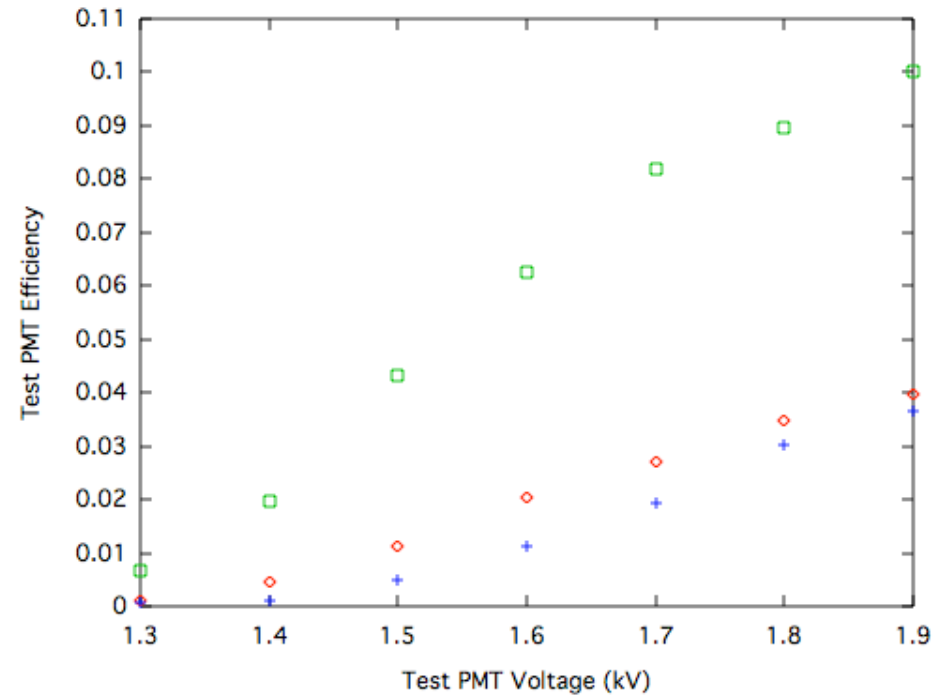
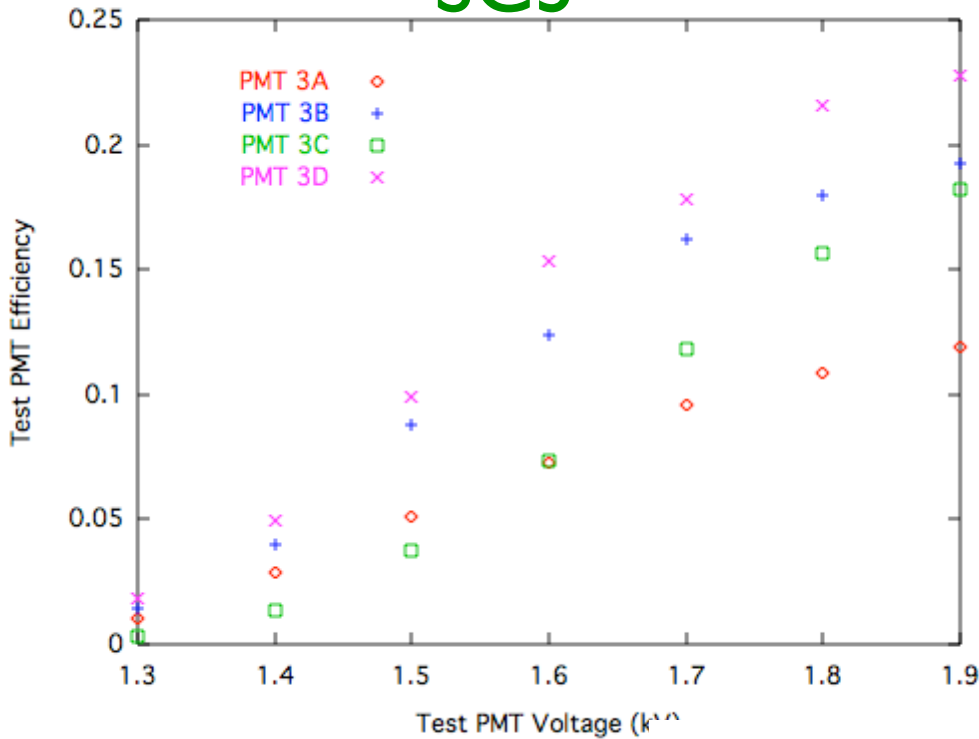
- Efficiency = Coincidences/Singles
- Lots of noise contamination



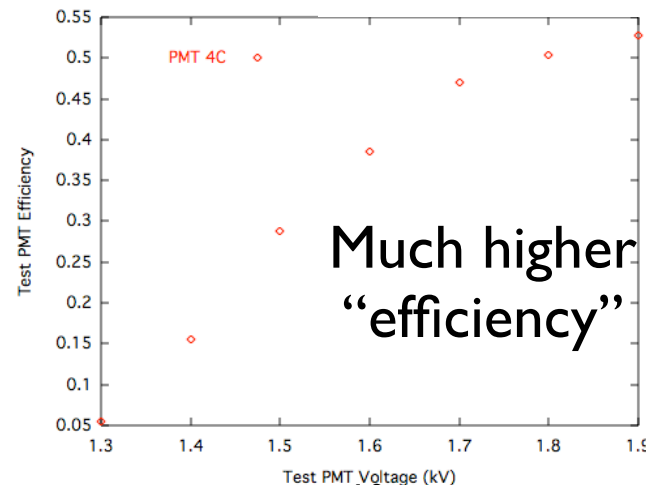
Small Scintillator Efficiency

SC3

SC4



Efficiency =
Coincidences/
Singles



Much higher
"efficiency"

Restricted by
number of
available power
supplies

Conclusions

- All scintillators work! (To first order)
- More detailed tests required to determine operating voltage and noise levels
- Shipping in CERN in the next few days

References

- Akagi et al: Performance of the Trigger Counters for E143
- Pixel wiki: <https://uimon.cern.ch/twiki/bin/view/Atlas/PixelScintillatorTriggerLayout>