A Little Presentation on Errors

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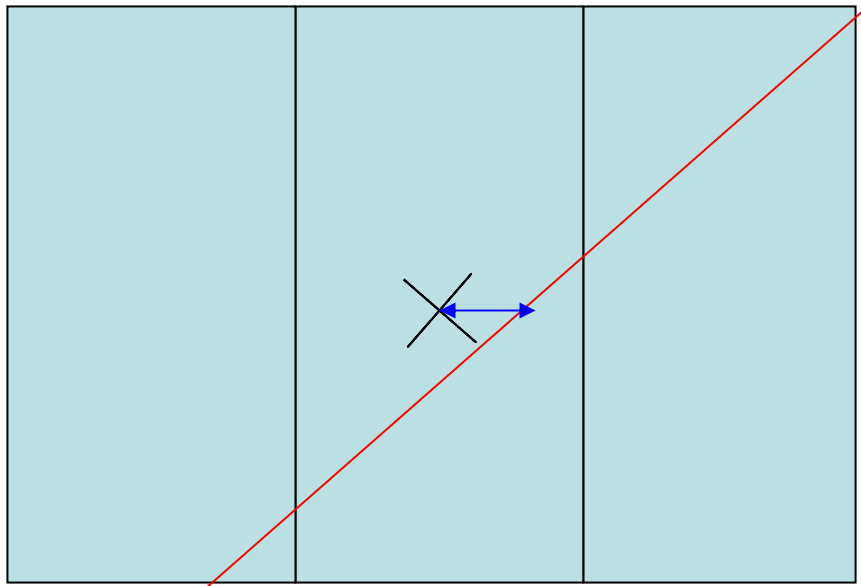
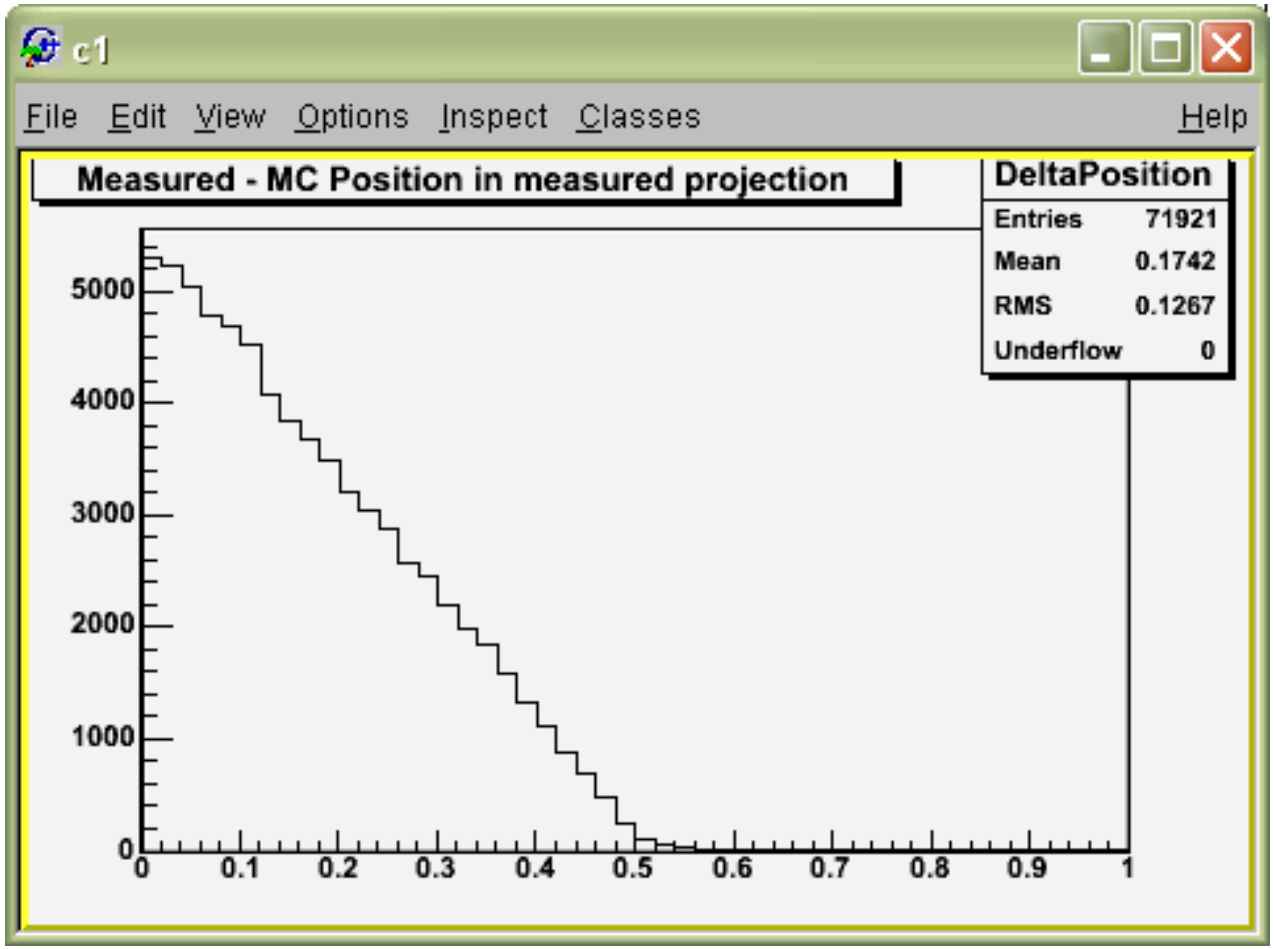
March 25, 2004

What is the measurement error “delta”?

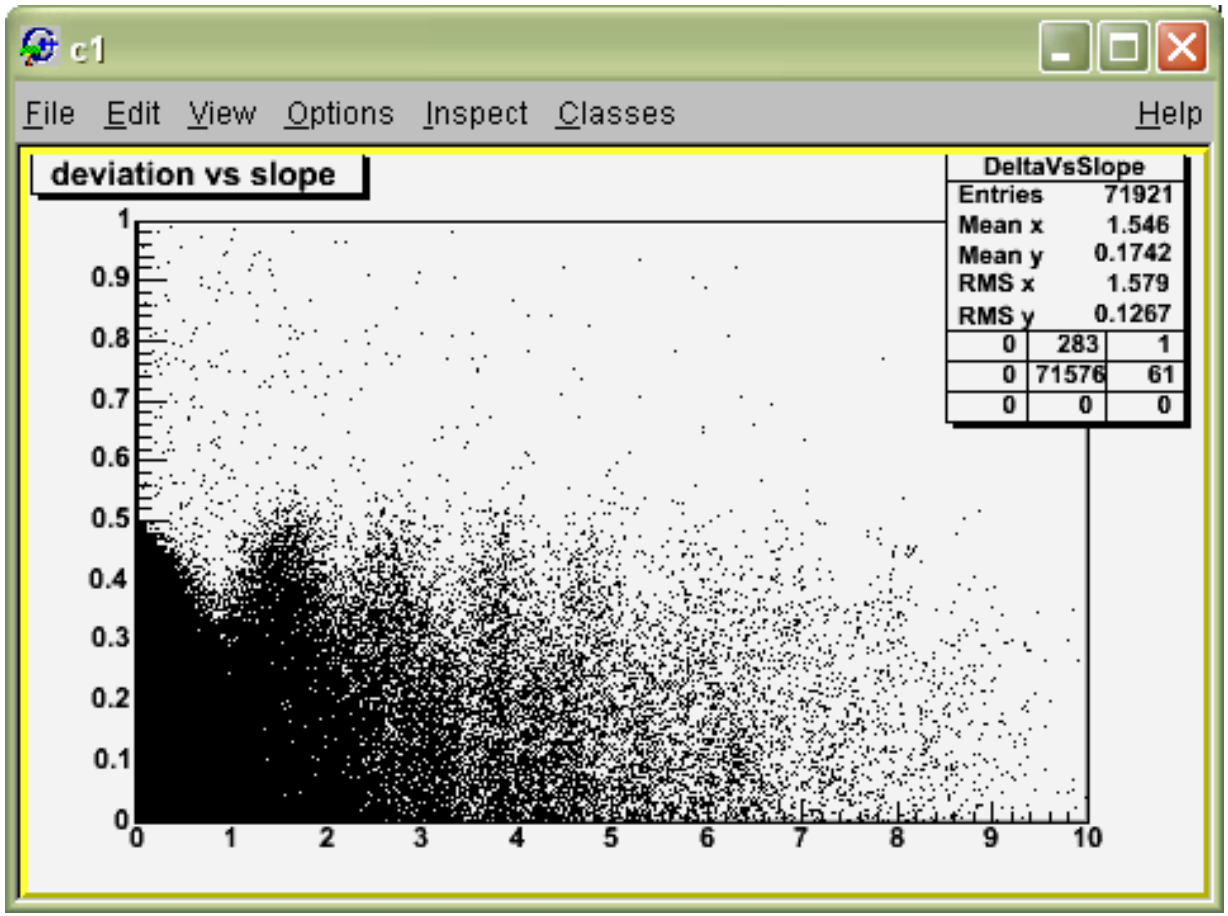


You might expect delta to be uniformly distributed
In each strip, so that the error on each
measurement would be stripPitch/√12

But…distribution of delta (all clusters)



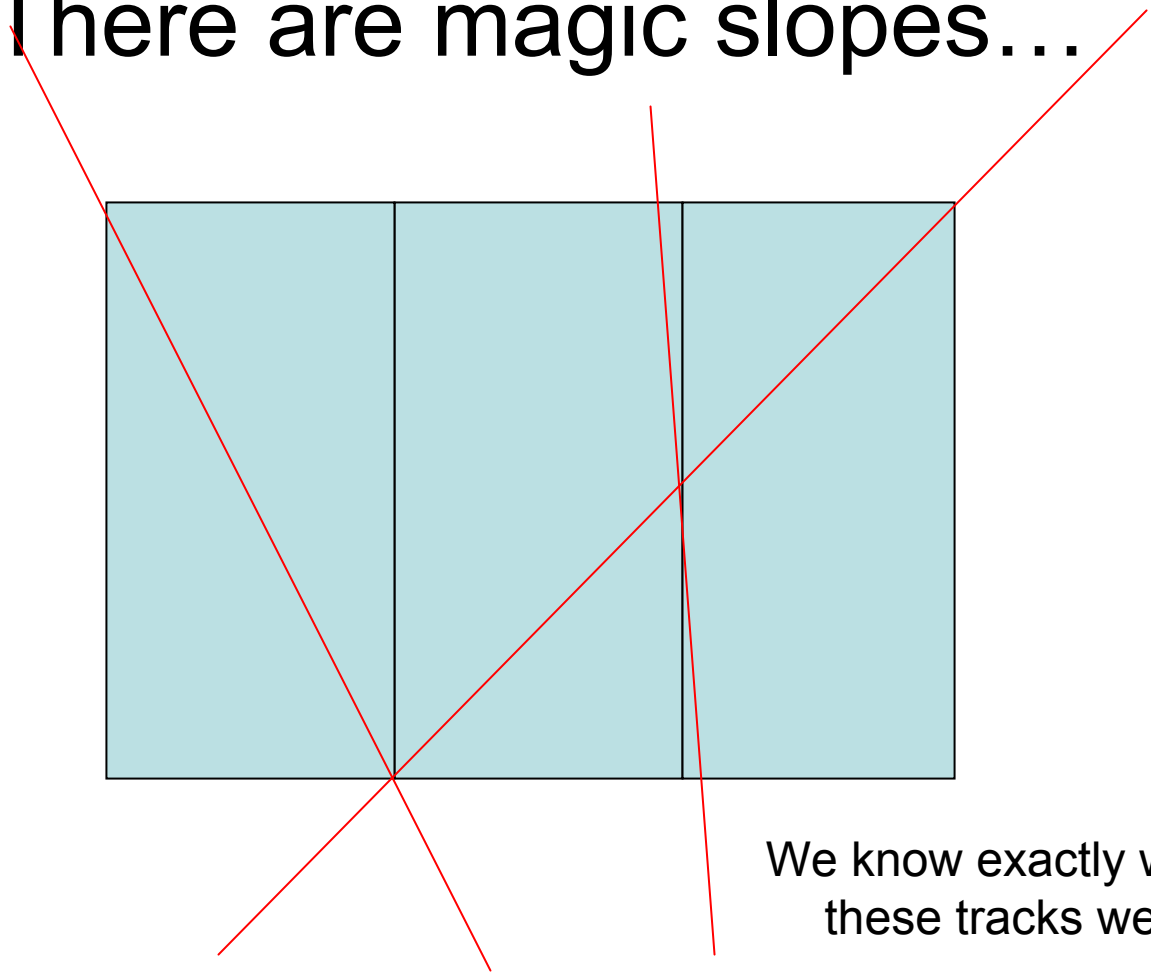
Delta vs Slope



Slope is in units of stripPitch/siliconHeight

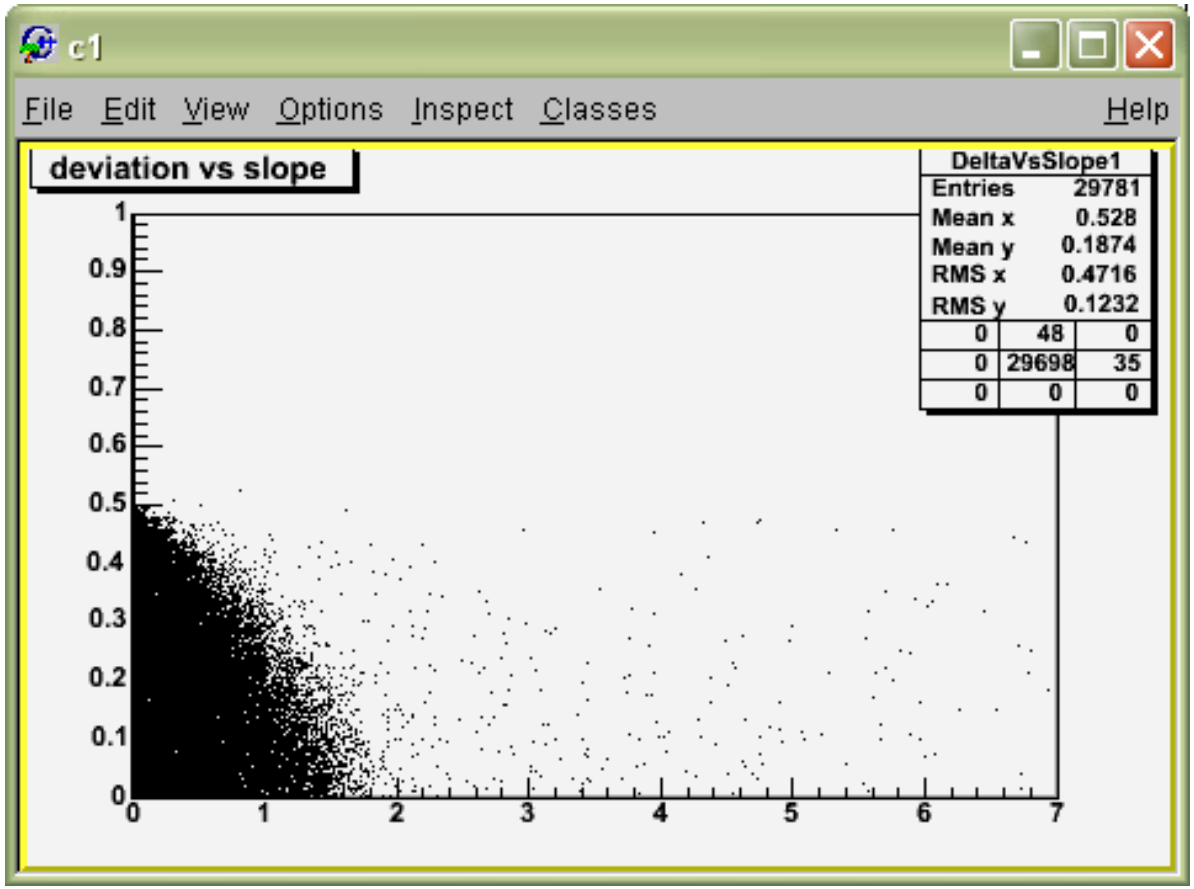
(Both slopes and deltas are folded around zero.)

What's happening?
There are magic slopes…

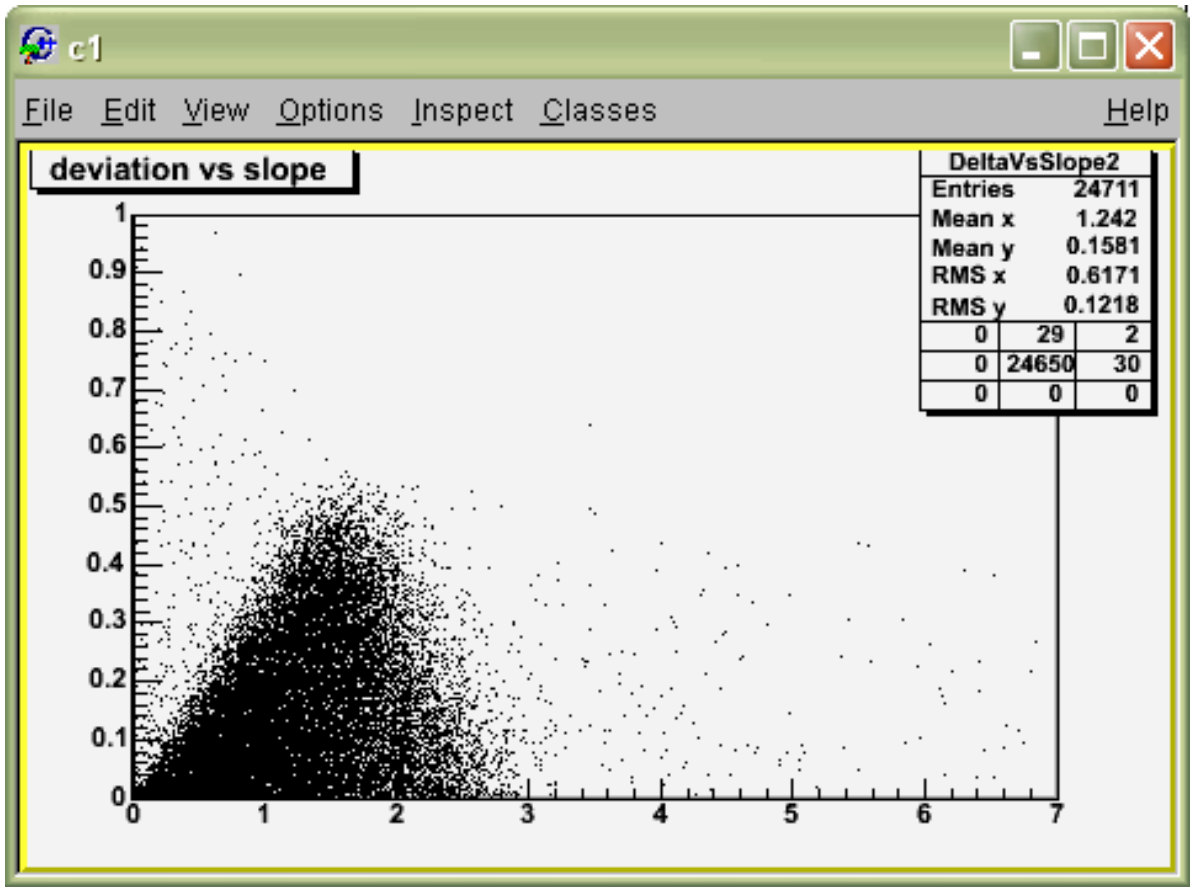


We know exactly where these tracks went.

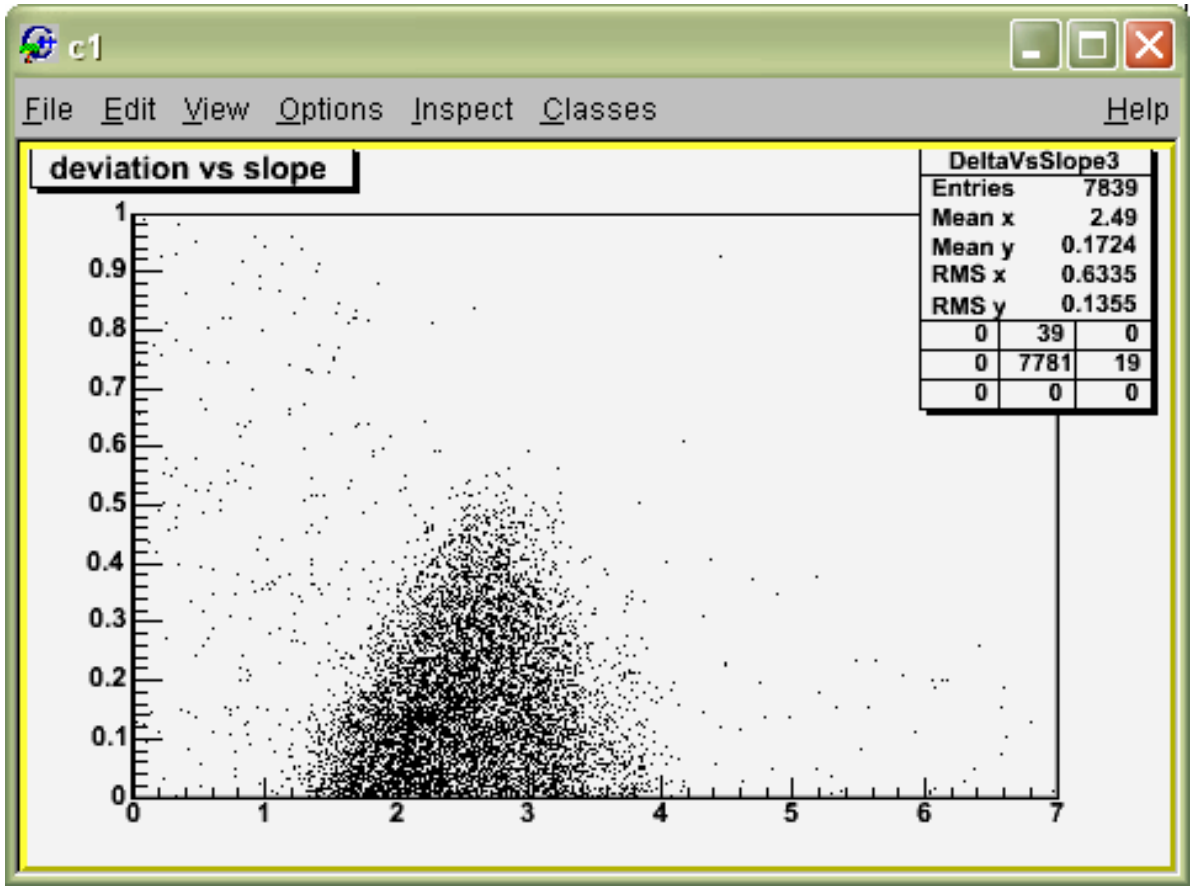
Delta vs Slope for one-strip clusters



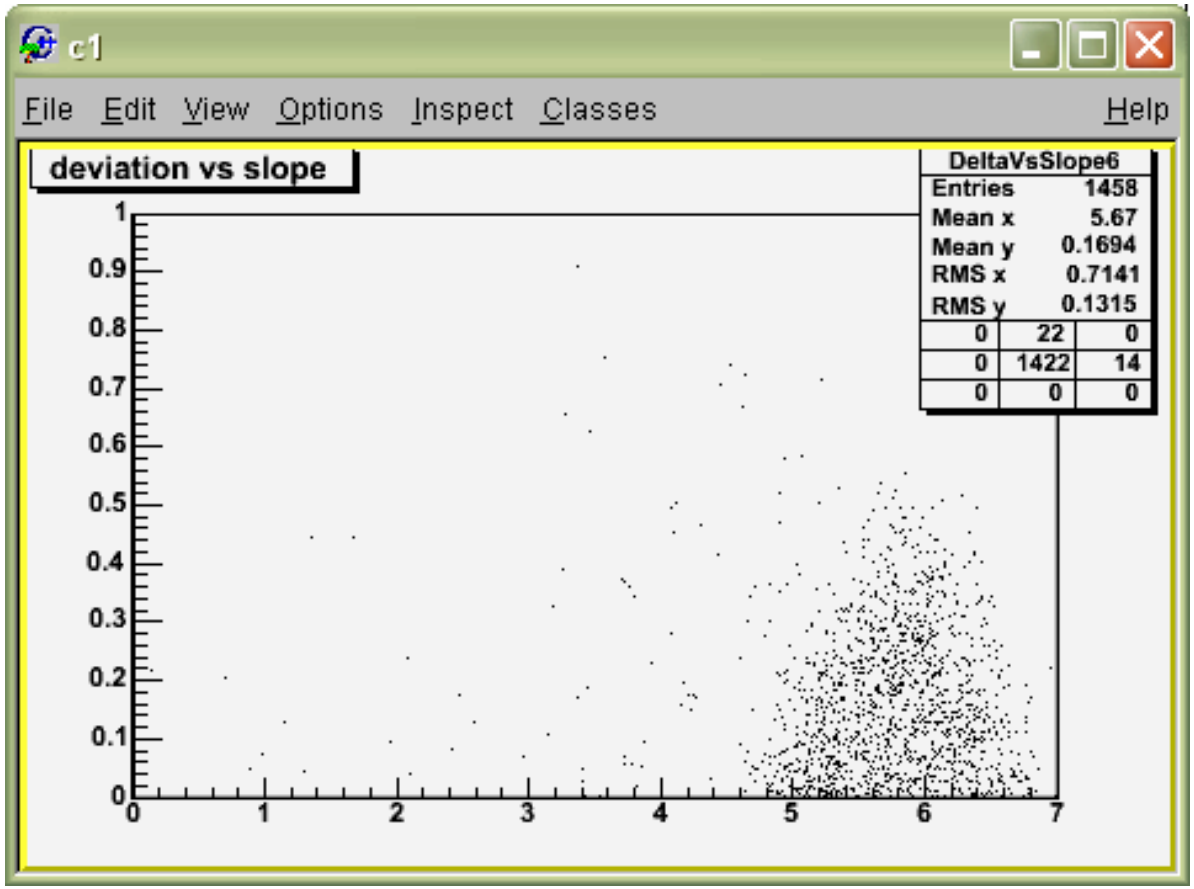
Delta vs Slope for two-strip clusters



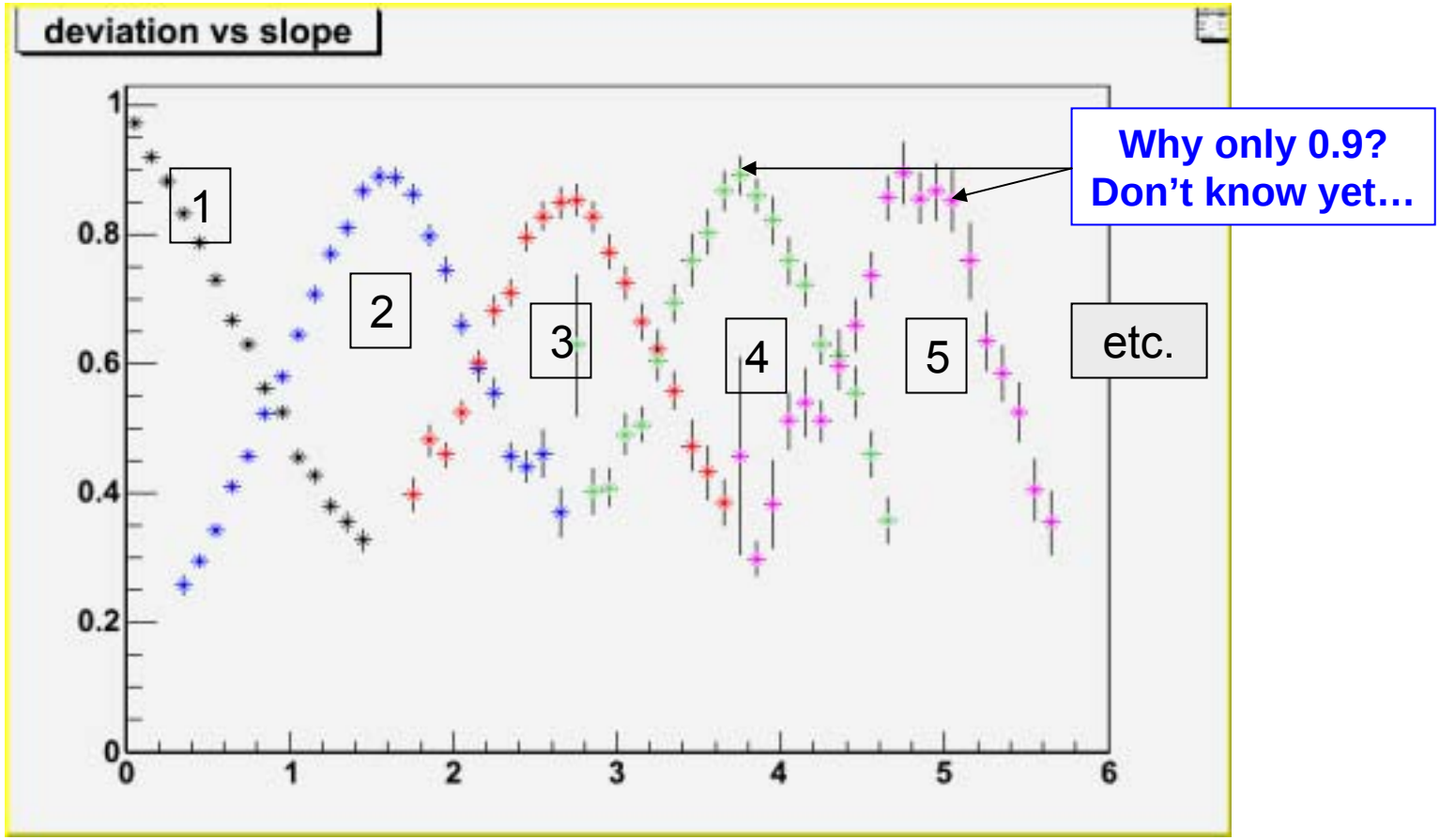
Delta vs Slope for three-strip clusters



Delta vs Slope for six-strip clusters



Error Factor



This is the factor by which the error is less than stripPitch/√12

So…

- Even if we have no information about the hits, stripPitch/√12 is the wrong error to assign… it should be stripPitch/√24.
- With knowledge of the track angle and the number of strips, a much better error estimate can be made.
- This can be done analytically… unbeknownst to me, Johann did this a couple of months ago!
  - Integrals over arctangents and logarithms… Ouch!

A refinement

The hit threshold modifies the argument a bit.

- Because a partially-hit strip may not be seen, the magic angle is modified.
- Tracks at an angle or those with a large energy deposited will effectively have a lower threshold
- So the shape of the distribution will depend somewhat on the angle and ionization of the track.