Calculated Cluster Sizes for RPCs

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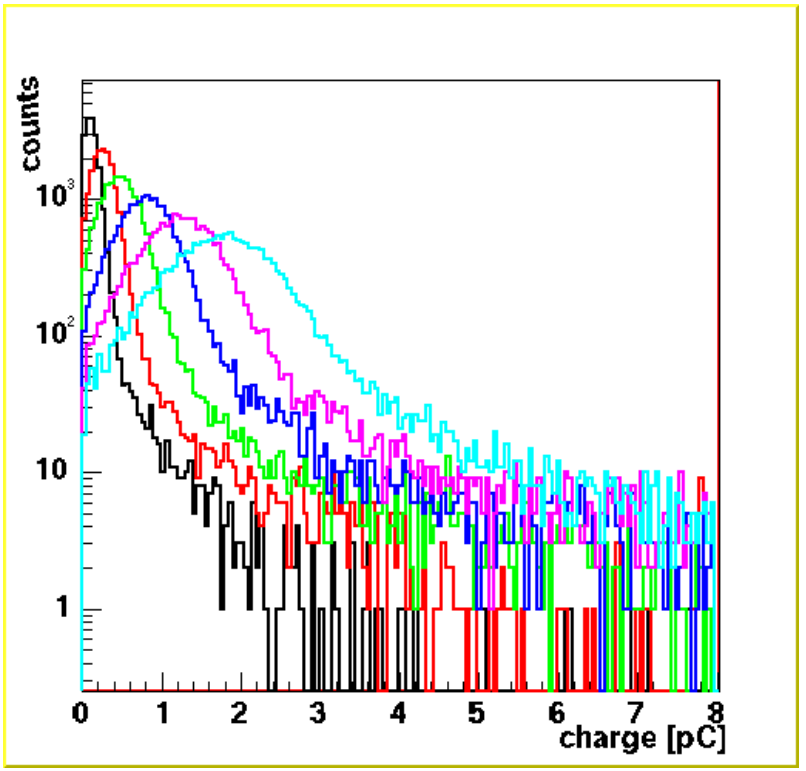
- **Cluster Sizes (=ClS) in RPC (1gap/2gap)**

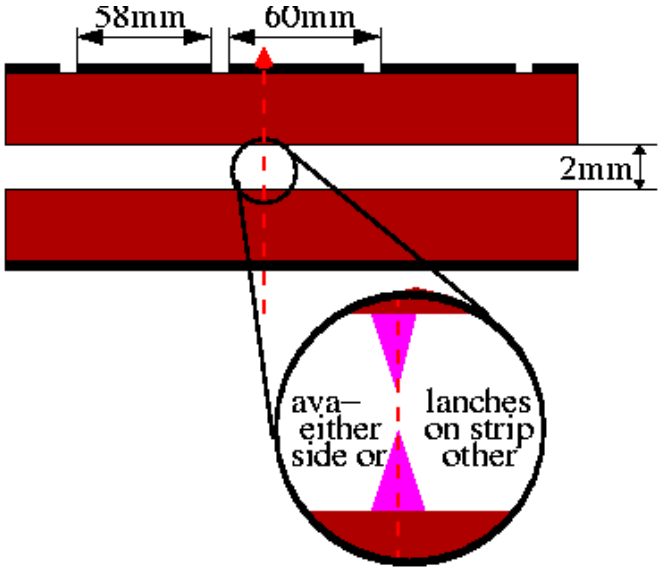
Monte Carlo I

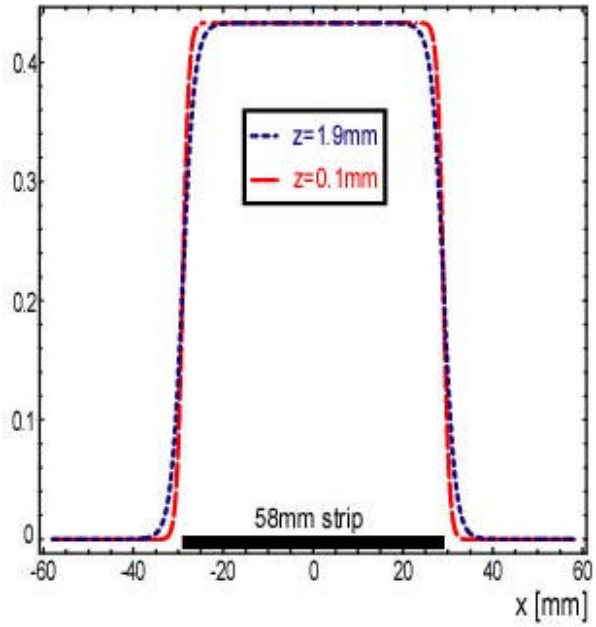
- Three pads (58mm width)
- The charge that is induced on the center pad is taken from real charge spectra (thanks to Gerardo)
- HV = 9.25kV, 9.5kV, 9.75kV, 10.0kV, 10.25kV, 10.5kV
- Tails up to 8pC



Monte Carlo II

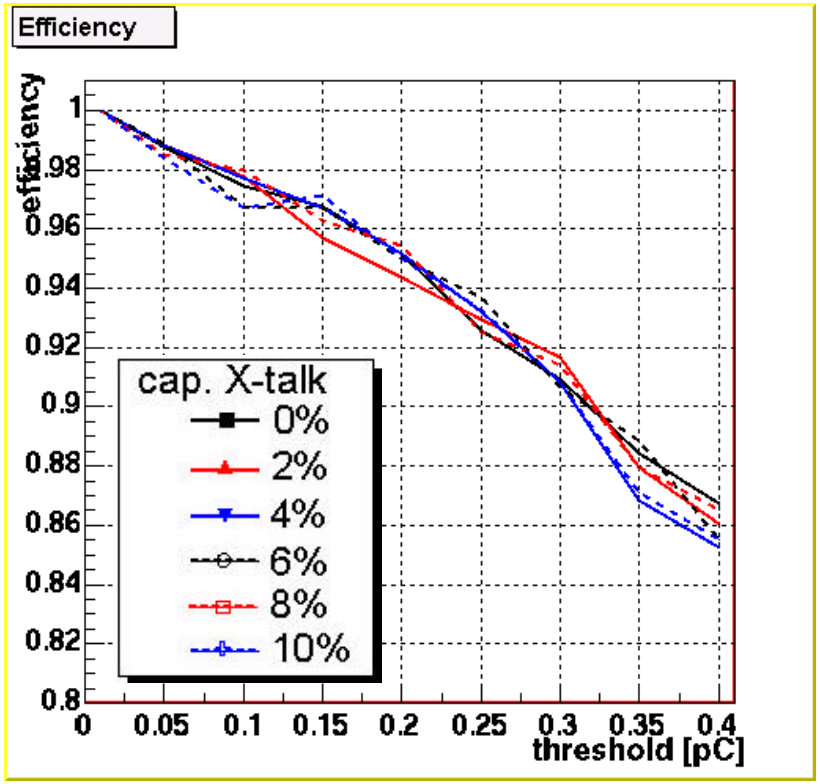
- Random perpendicular tracks (Testbeam)
- Use Weighting Field (WF) to calculate direct X-talk on neighbor pads
  - Avalanches either on strip side or other side Þ different induced charges
- Add capacitive X-talk: 0% … 10% (pulse height ratio)
- Qind(x) = Qind(x=0) • WF(x) / WF(x=0)
- WF in RPCs: CERN-OPEN-2001-004 or CERN-EP-2001-074





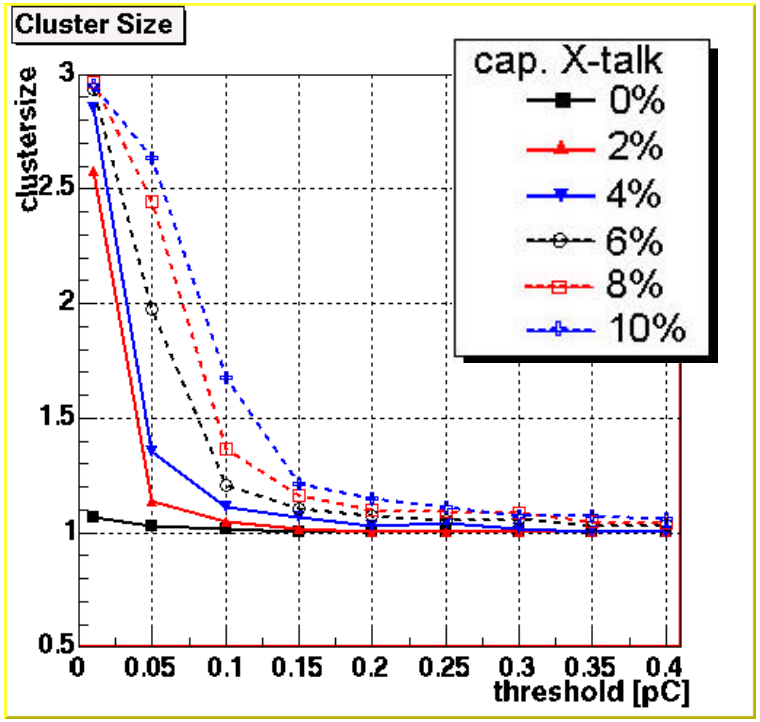
1 Gap; 10kV; Efficiency

- There is no difference if avalanche is on strip side or other side
- Capacitive X-talk does not influence the efficiency
- Thr = 100fC Þ Eff = 97-98%

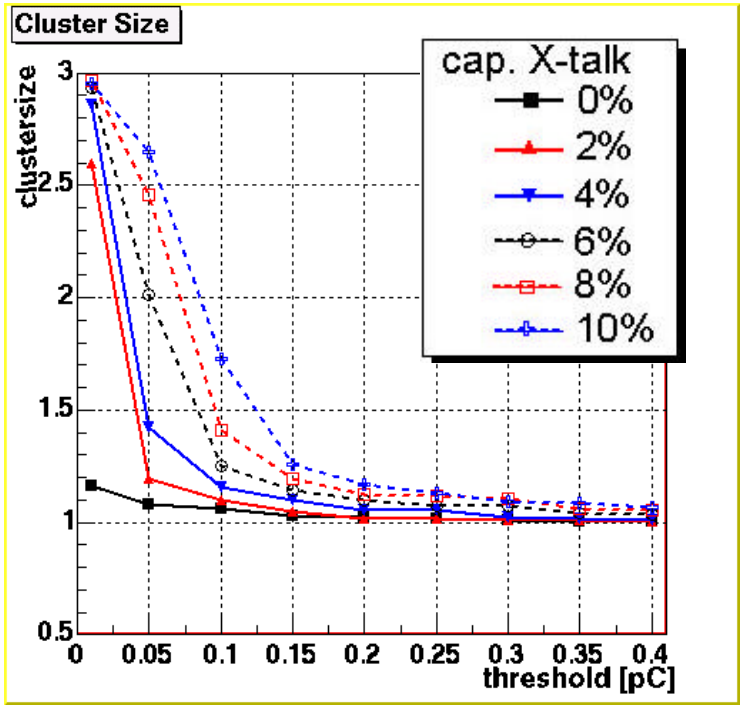


1 Gap; 10kV; Cluster Size

- **Avalanches at side of strips**



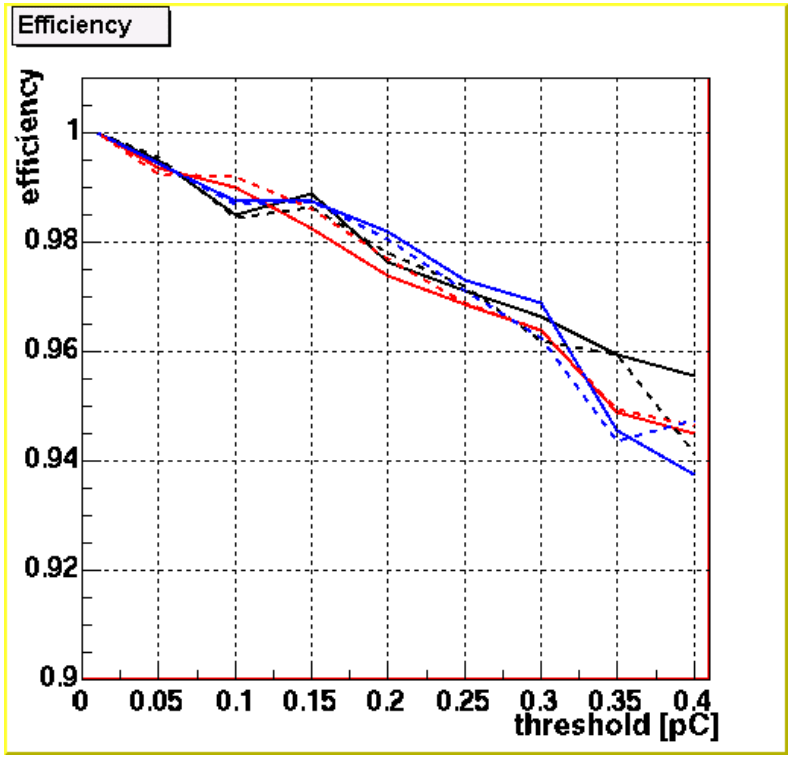
- **Avalanches at opposite side of strips**

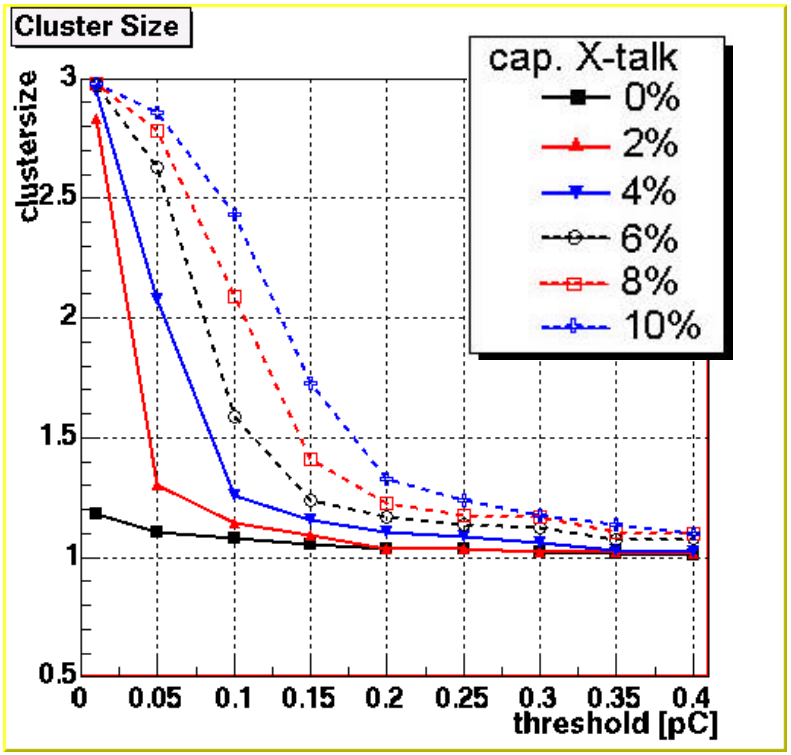


- **Very small difference**
- **Thr = 100fC Þ Eff = 97-98%; ClS = 1.1 … 1.75**

1 Gap; 10.25kV

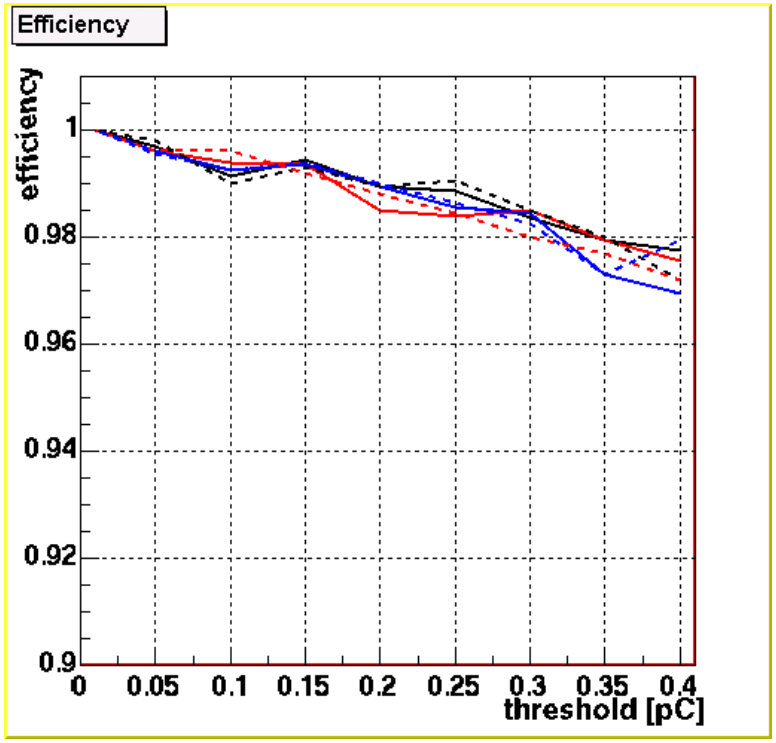
- **Thr = 100fC Þ Eff = 99%; ClS = 1.1 ... 2.4**

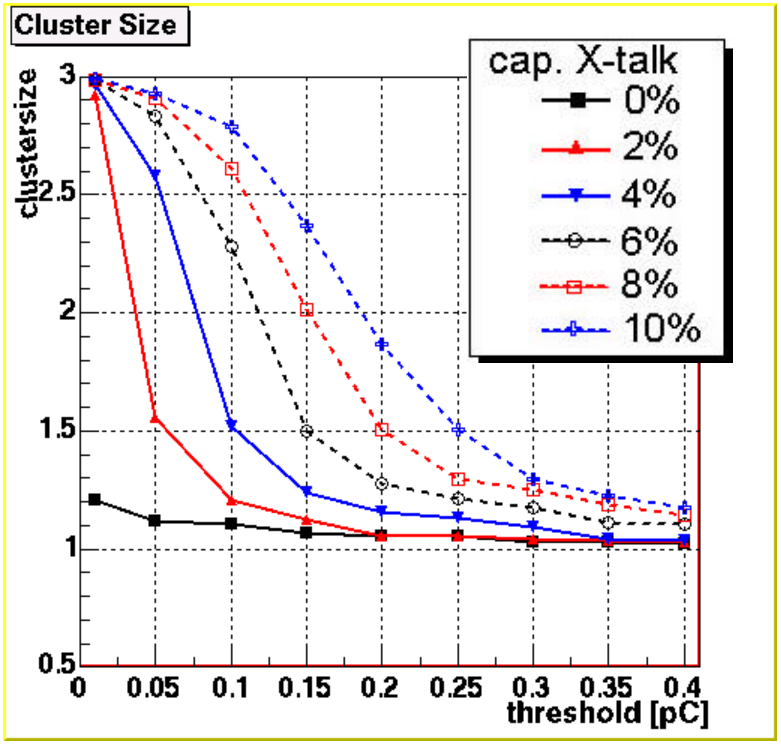




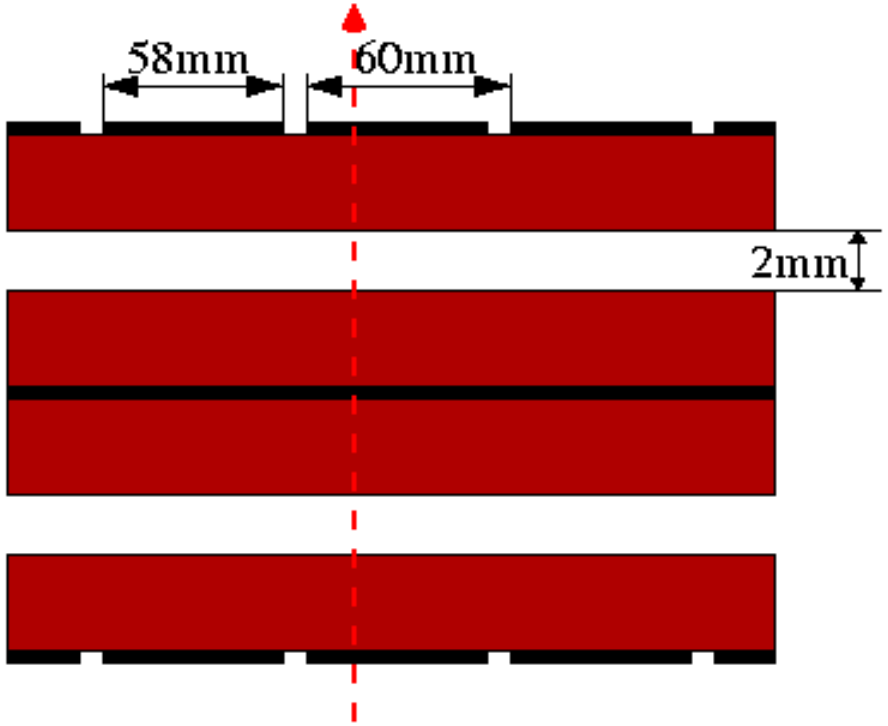
1 Gap; 10.5kV

- **Thr = 100fC Þ Eff = 99.5%; ClS = 1.1 …. 2.8**



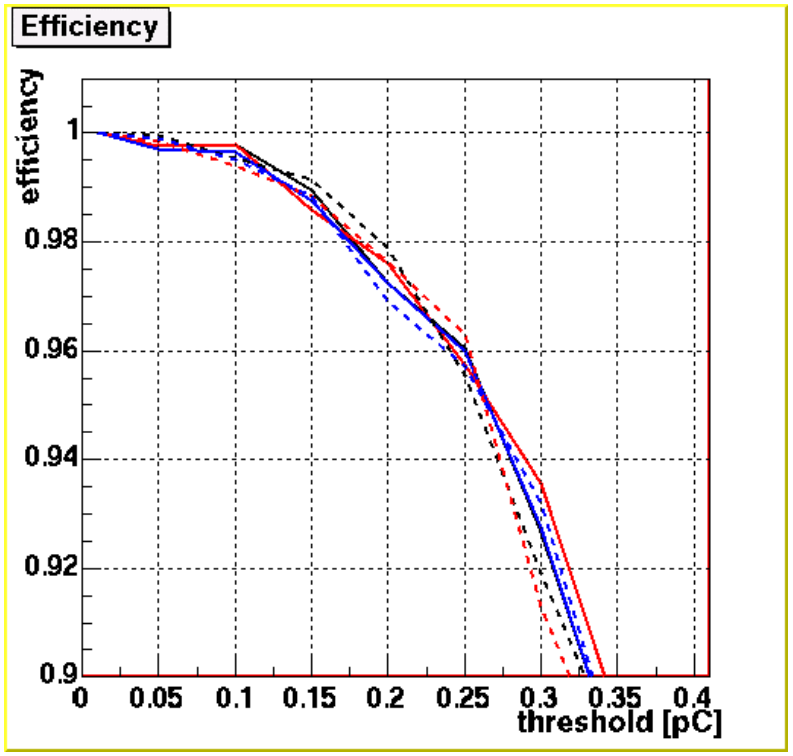


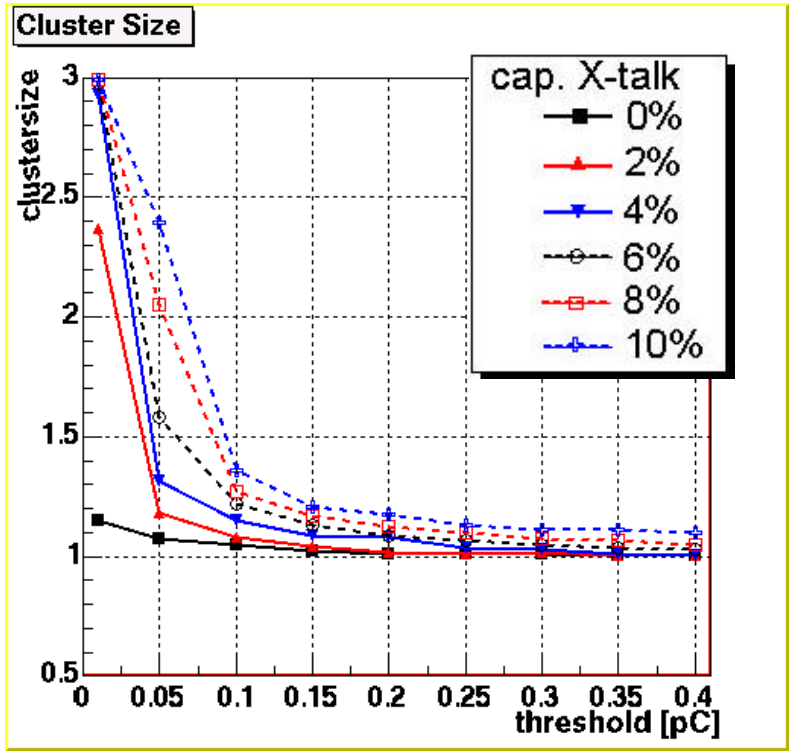
2 Gaps



2 Gaps; 9.75kV

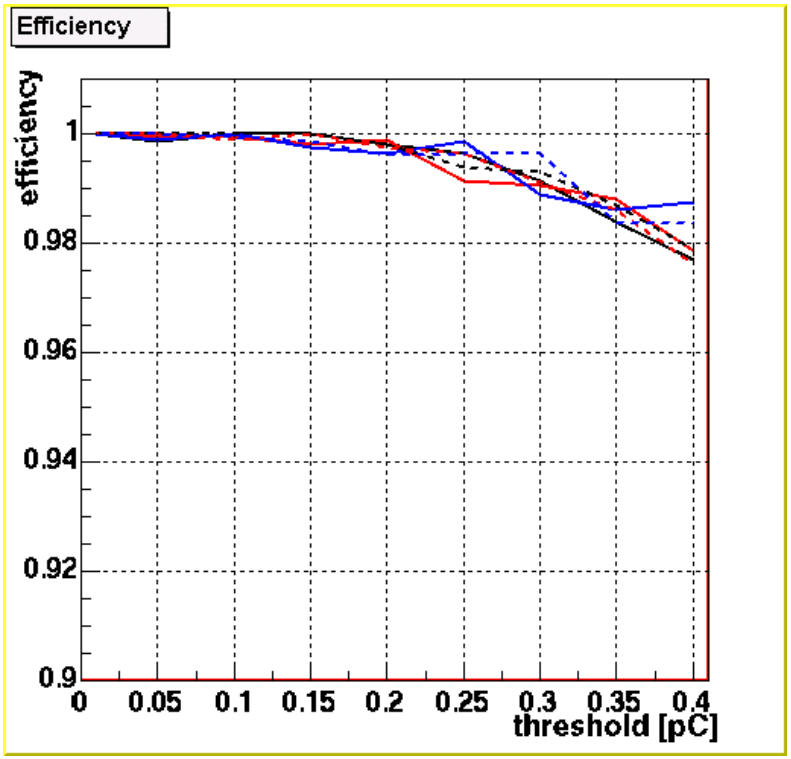
- Thr = 100fC Þ Eff = 99.5%; ClS = 1.05 … 1.35

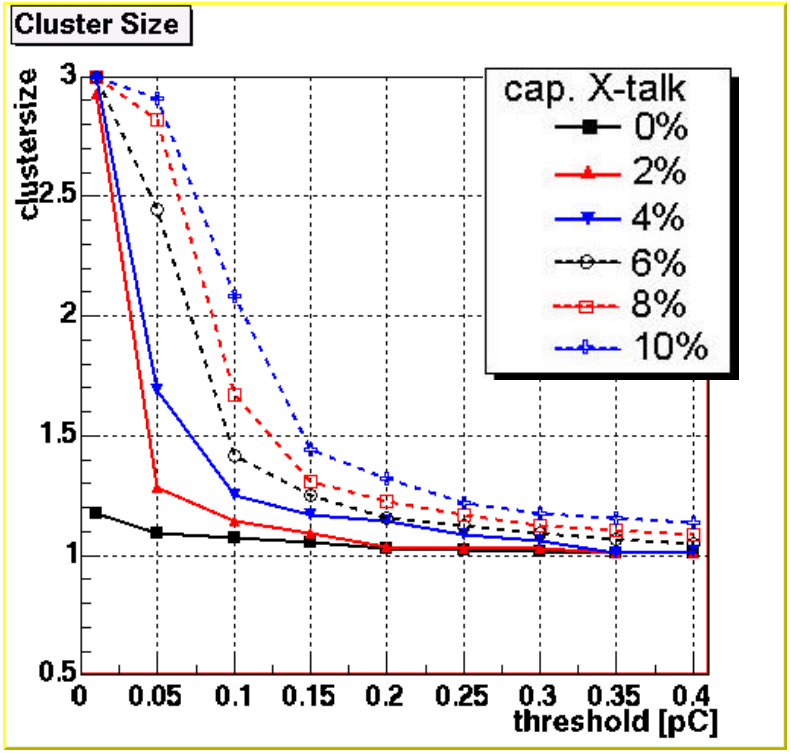




2 Gaps; 10kV

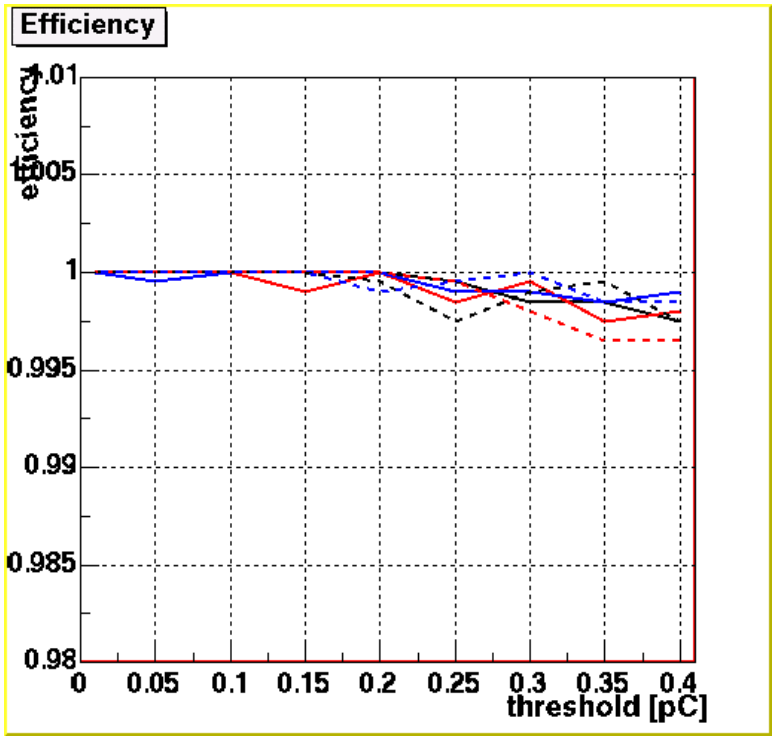
- Thr = 100fC Þ Eff = 100%; ClS = 1.1 … 2.1

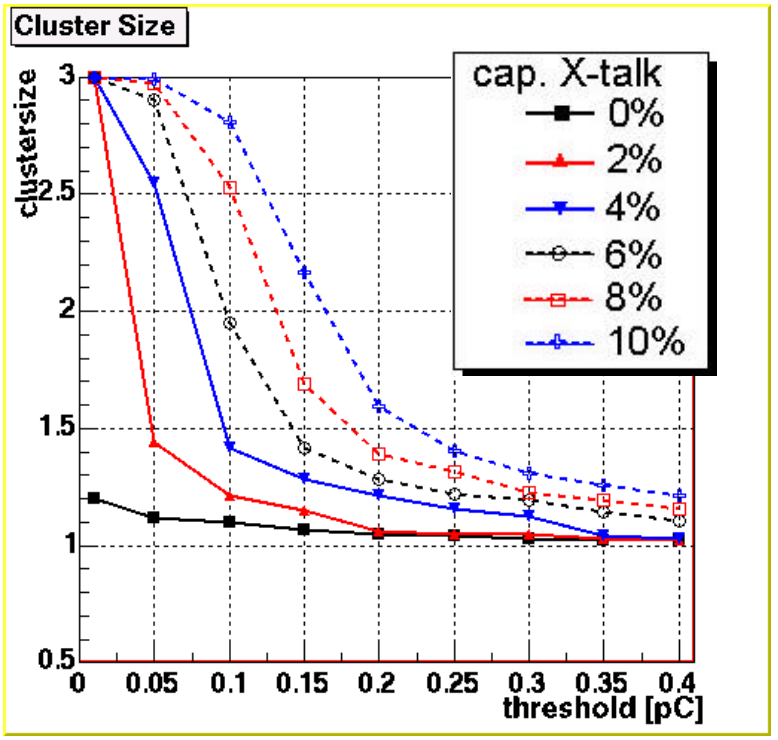




2 Gaps; 10.25kV

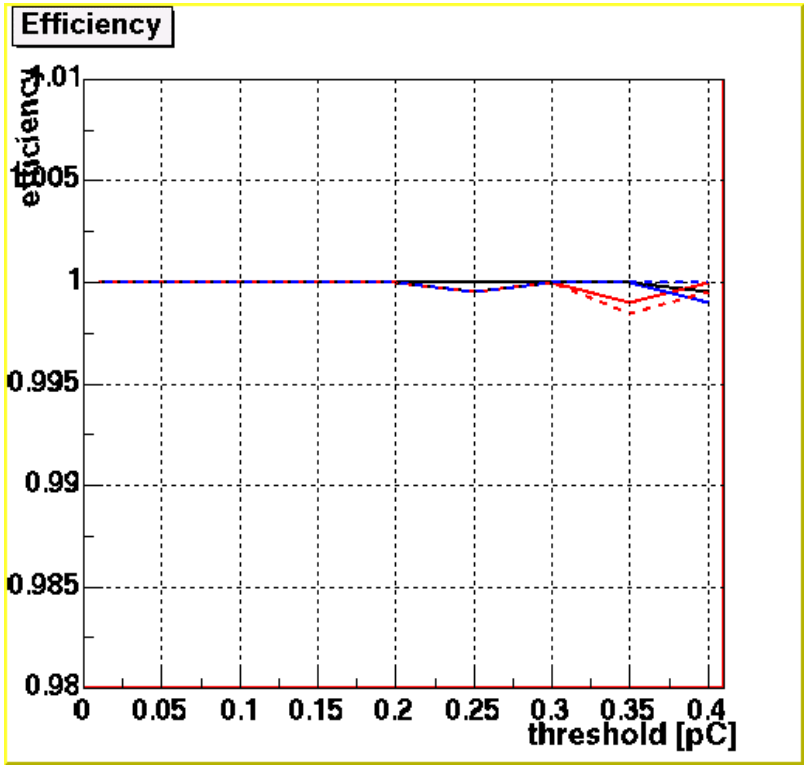
- **Thr = 100fC Þ Eff = 100%; ClS = 1.1 … 2.8**

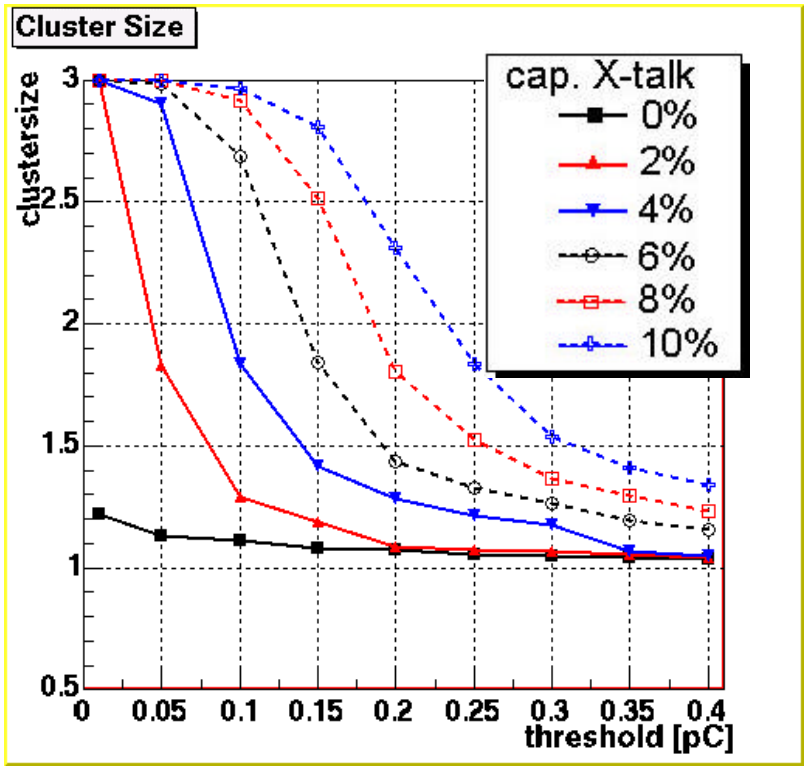




2 Gaps; 10.5kV

- Thr = 100fC Þ Eff = 100%; ClS = 1.15 … 3.0





Summary/Conclusions

- CIS and Efficiency are similar for the two orientations of the avalanche
- CIS is influenced largely by capacitive X-talk
- 1 Gap; Threshold 100fC; 2% (4%) capacitive X-talk: 99.5% Efficiency at 10.5kV with CIS 1.2 (1.5)
- 2 Gaps; Threshold 100fC; 2% (4%) capacitive X-talk: 99.5% Efficiency at 9.75kV with CIS 1.1 (1.2)