CALICE: News Since May

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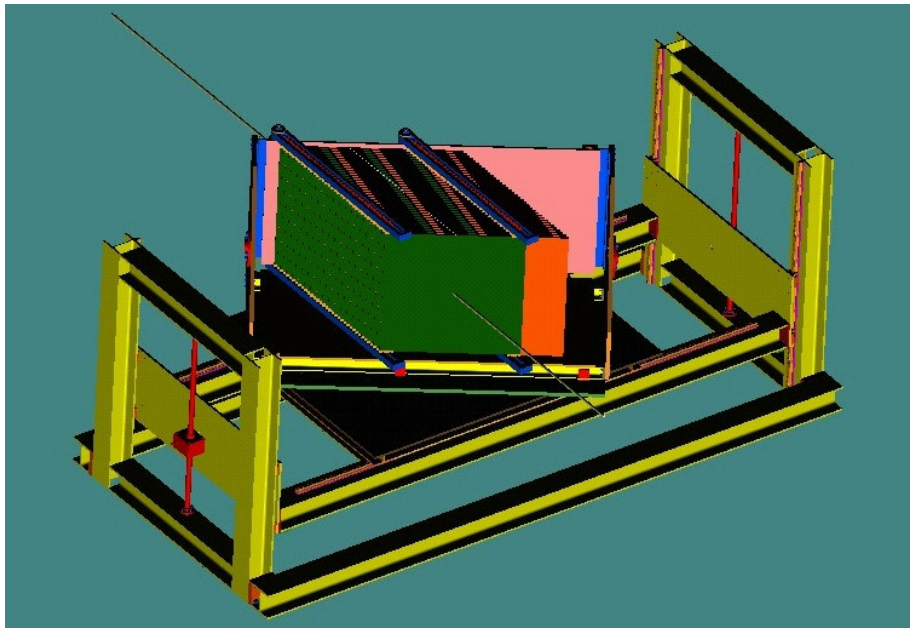
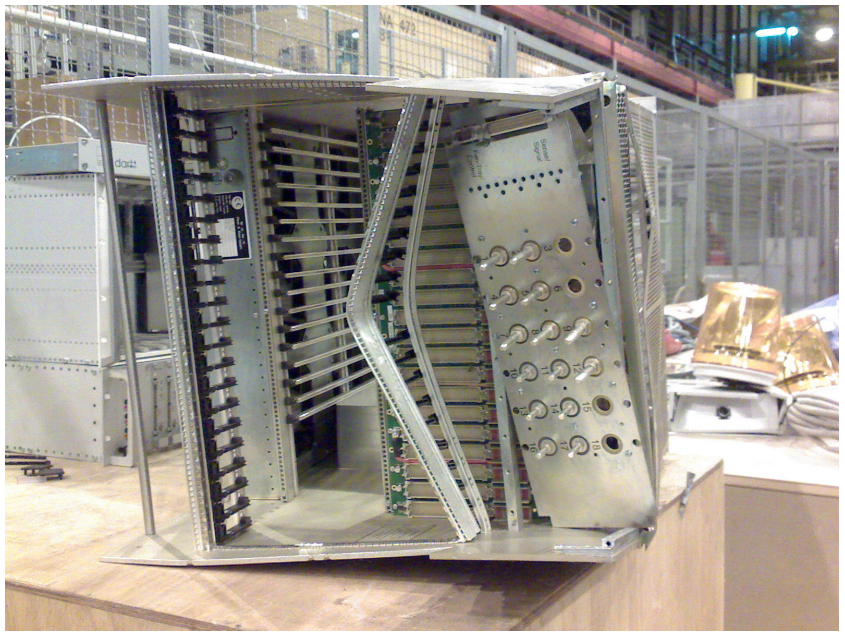
Three main items:

- Beam test status
- Political developments
- MAPS information

CERN 2007 beam tests

- Transport "incident" ☹
  - Movable stage came loose in transit from DESY to CERN
  - Caused significant damage to itself and the electronics racks and crates mounted on it
  - No custom equipment (calorimeters, readout boards, etc) involved



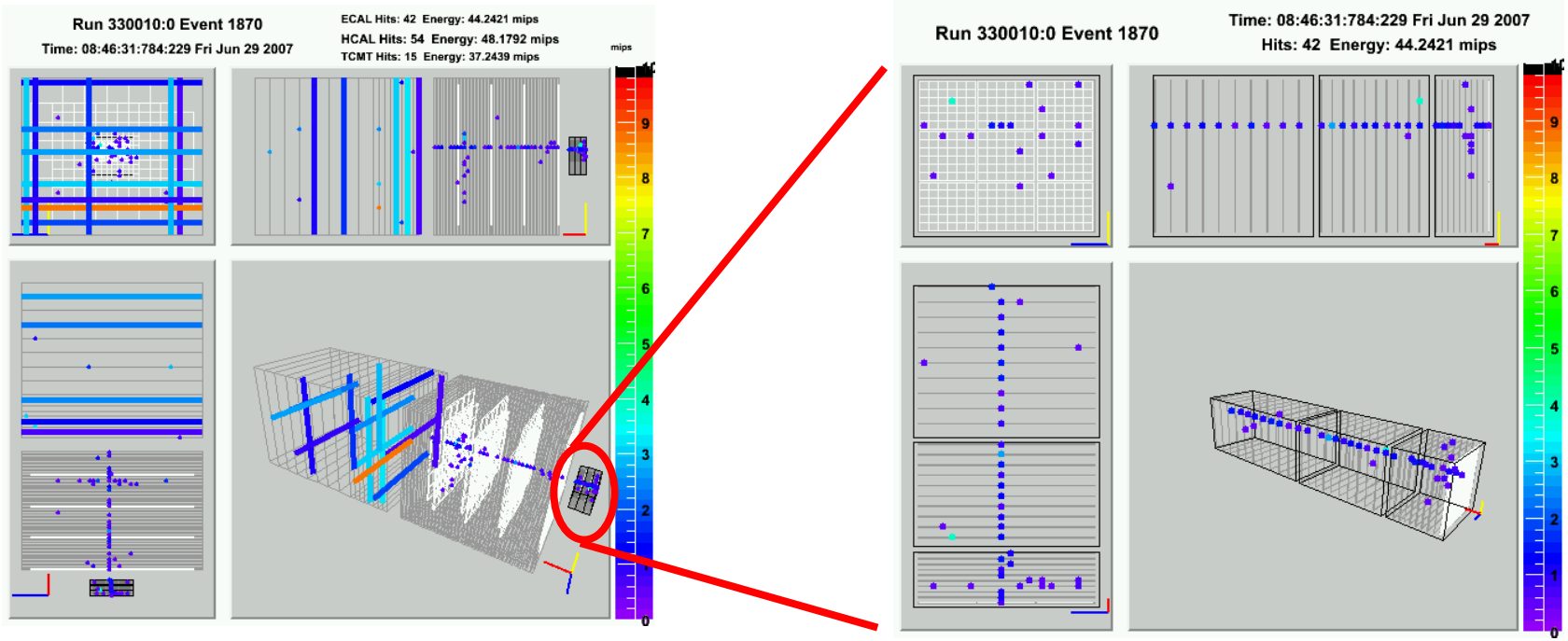


Implications for UK

- Have managed to get temporary replacements
  - Electronics rack from DESY
  - VME crates from CERN loan pool
  - Power supplies from various labs
- Movable stage itself partially repaired
  - Movement restricted; more complete fix may be possible during a week downtime in late July
- Some UK equipment was broken
  - One of the two VME crates was from UK so may have to buy a replacement; up to ~£5k depending on power supply (as yet untested)
  - Several readout cables were severed; some replacements needed which may be ~£1-2k
- Assuming this will be from working allowance
  - Insurance issues are very unclear….

Beam tests are going ahead

- Overall we only lost a few days because of damage
  - We are primary users from Thursday afternoon
  - Currently whole system working and taking parasitic muons from upstream experiment
  - Should have small impact on programme, particularly if stage can be fully repaired half way through run



Worldwide political situation

- Many significant developments during Linear Collider Worldwide Studies (LCWS) meeting in early June
  - Push from ILC leadership to form detector collaborations soon
  - Perceived need to match accelerator time-early schedule for approval
- Want fully-costed, fully-engineered detector reports by 2012
  - Detector concept groups to write LoIs by mid-2008
  - Two LoIs chosen by end 2008 to proceed to "light" EDRs by 2010
  - Two full EDRs following these by 2012
- The two LoIs which will be "chosen" are already pretty clear
  - Two of the large concept groups (LDC and GLD) have decided to write a combined LoI; generically now called GLDC
  - The third large (and particle flow-based) concept (SiD) will write a separate LoI
  - The fourth concept is too small to stand alone so is almost guaranteed to join one of the other two LoIs

R&D Review at LCWS

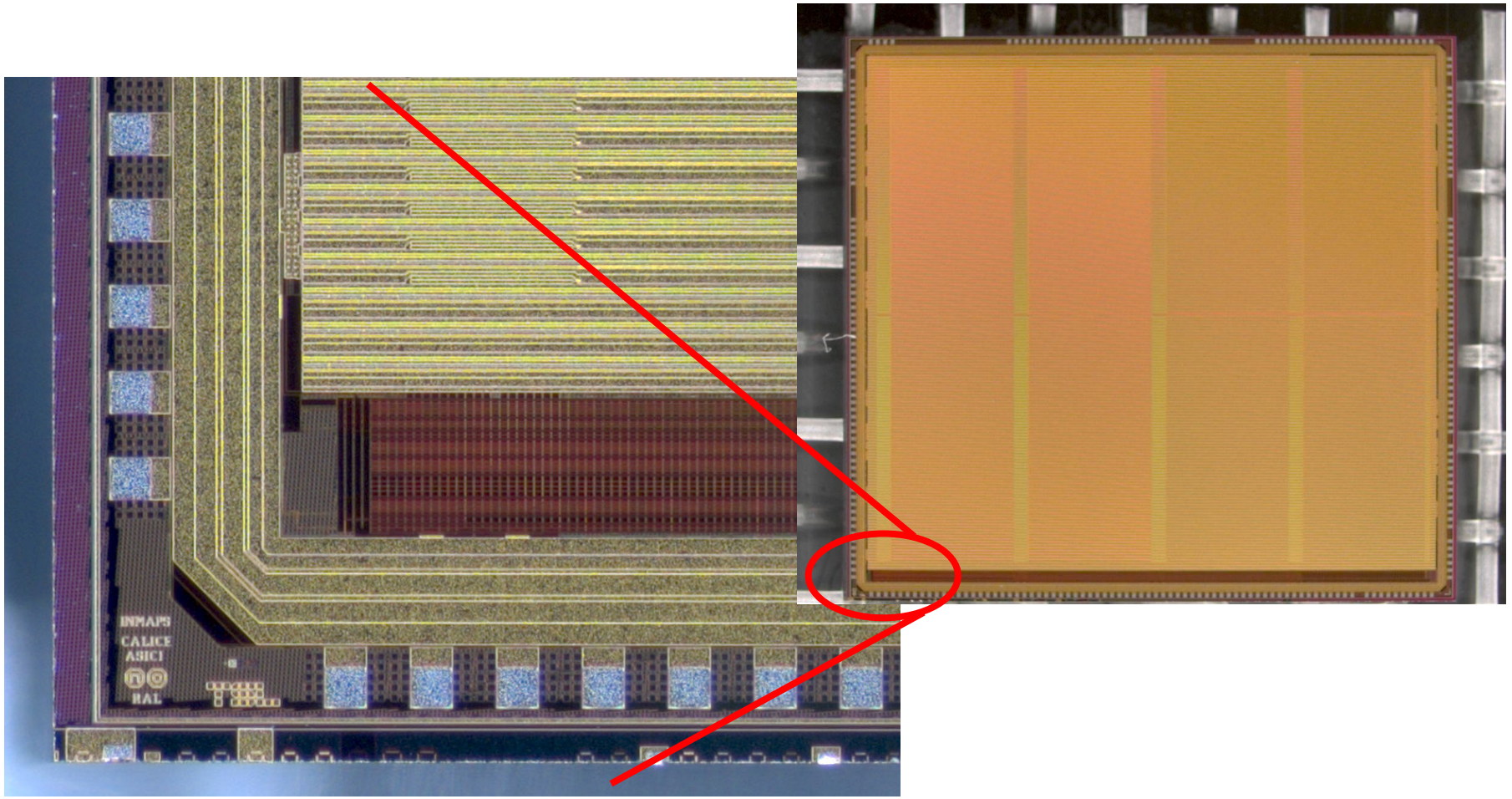
- Reviews of worldwide ILC detector R&D ongoing
  - Cycling through subsystems, one reviewed at each ILC meeting
  - It was the turn of calorimetry at LCWS in early June
- CALICE submitted a document to the review
  - Copy supplied to the OsC
- There were ten presentations to the review committee
  - Four of the ten were UK speakers, including the presentation of beam test results; draft note on beam test results supplied to the OsC
- Review committee recommendations not yet released
  - Clear verbal feedback that they strongly approve R&D plans
  - However, more input to detector concepts is needed
  - Required throughout period leading to light EDRs in 2010
- Reinforces the same issues as above
  - We need to start working with the detector concepts

UK response

- The detector R&D is supposed to be concept-independent
  - CALICE is orthogonal to the concept groups and should contribute to all
  - WP5 has elements of contributing to detector studies already
  - But the above developments will force us to choose collaborations (and maybe technological preferences) before R&D is complete
- CALICE-UK must get involved with both GLCD and SiD
  - Probably select at level of institutes but need to ensure at least WP2 and WP3 are involved in both
  - Technology choices should not be made at the time of the LoI but want to be sure our R&D is under consideration for both
  - Contacts have been made and will need to be strengthened
- Will have implications for travel budget
  - Covered under WP5 but clearly will need to be at a higher level than previously assumed
  - Very hard to guess cost implications right now as just starting

News: MAPS sensor returned

- First sensor sent to RAL from foundry yesterday
  - Two weeks earlier than scheduled when submitted

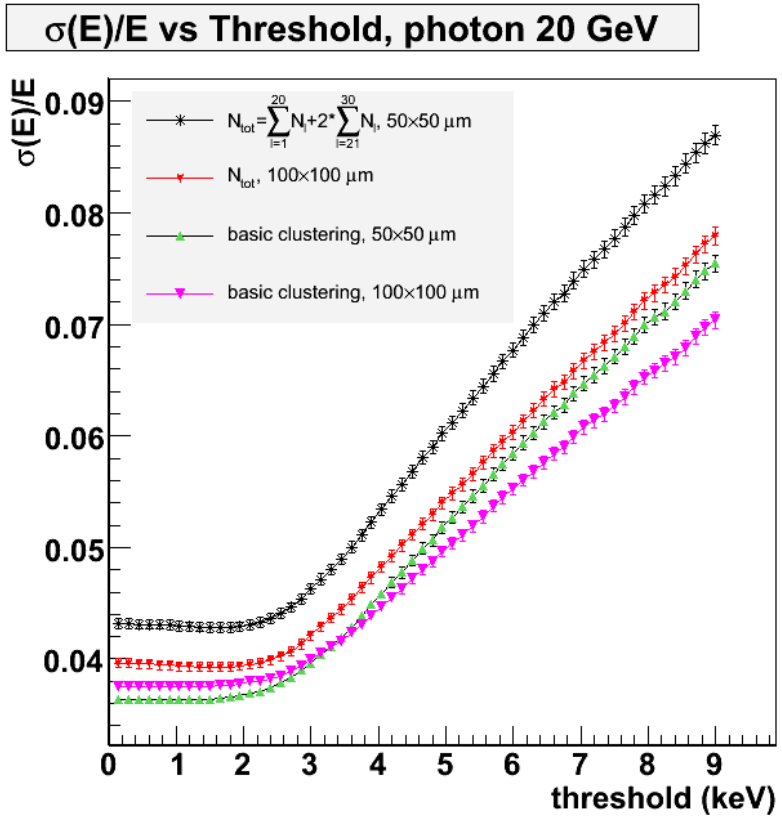


MAPS pixel size

- OsC asked for a study on pixel size
  - Current sensor is $50\times50\mu m^2$; asked about doubling it to $100\times100\mu m^2$
- There are many issues involved
  - Particle density in core of high energy showers
    - Can lead to non-linearities given binary readout
  - Collection of diffusing charge over larger area
    - Slower collection time, reduced collection efficiency OR
    - More collecting diodes, higher noise
  - Dead memory fractional area
    - Currently limited by number of traces routed over each pixel
  - Square vs. hexagonal pixels
    - Charge diffusion times may be improved
    - Charge sharing at corners would be 1/3 not 1/4
  - Power consumption per pixel effectively independent of size
    - Total power reduced with larger pixels
- N.B. No difference in manufacturing cost of sensors

MAPS resolution

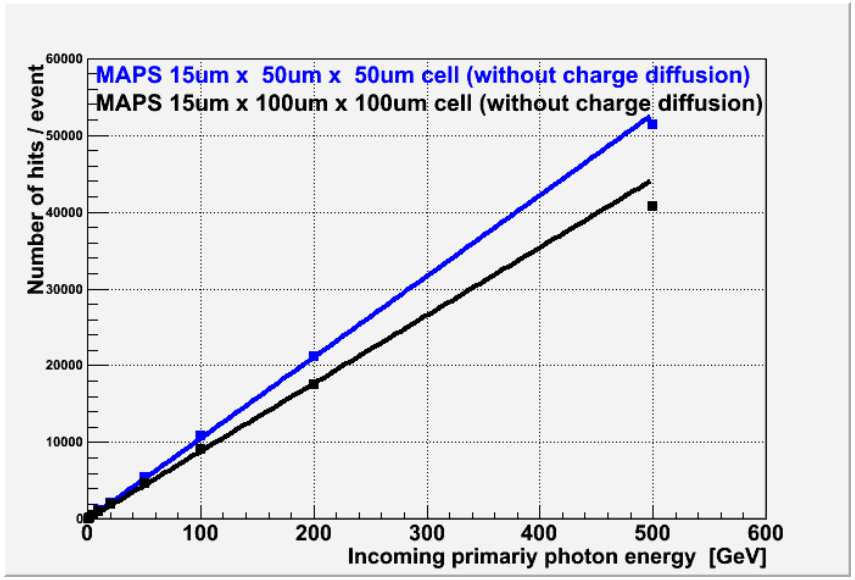
- Clustering can be used to reduce effects of crossing pixels
  - Edge effects give fluctuations in number of pixels; worse resolution
- Quick study of clustering with $50\times50\mu m^2$ and $100\times100\mu m^2$
  - Uses only "truth" energy deposits in epitaxial layers

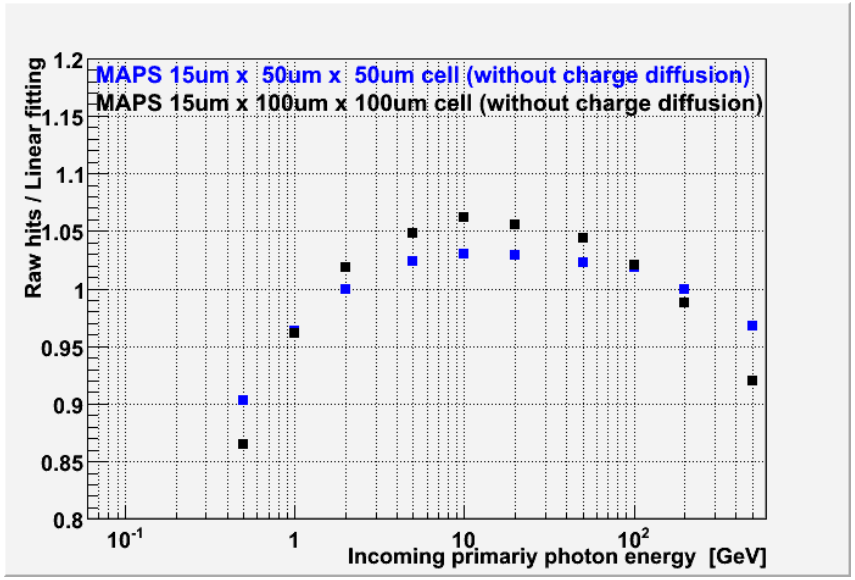


After clustering, resolution does not depend strongly on size

MAPS linearity

- Linearity clearly depends on size
  - Rule-of-thumb; high energy EM shower core density is 100 MIPs/mm^2 which is 1MIP/100×100μm^2
  - Current size chosen to reduce non-linearity





- 100×100μm^2 shows larger non-linearity
  - Weighted clustering could be used to reduce this effect (under study)
- Need to check charge diffusion model to do proper job

Summary

- 2007 CERN beam tests are just starting
  - Damage in transit caused small delays
  - Possible cost implications for the UK
  - Less than £10k total
- ILC political situation changing rapidly
  - UK needs to respond
  - Travel cost implications
  - Hard to quantify until work starts
- MAPS sensor is ready
  - Studies of pixel size are ongoing
  - Need verification of sensor simulation before serious study is possible