
# GLAST activities in France

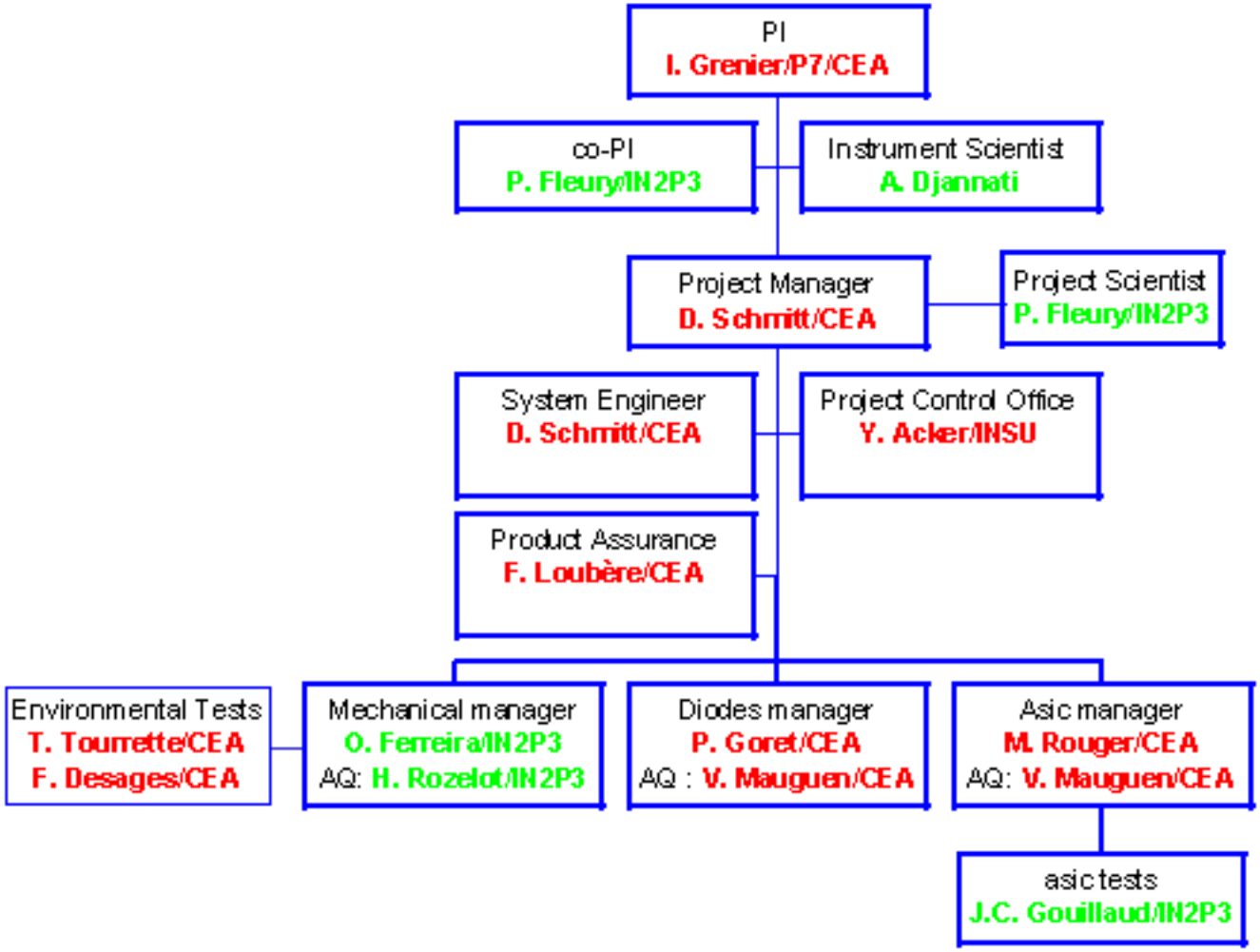
- Collaboration status and Team organization
- C-cell CAL design & qualification
  - mechanical structure
  - light yield
  - diode characterization
  - gluing or not gluing
- ASIC development
- Software activities


# French collaboration

- **Interagency agreement**
  - CNES, CEA, and IN2P3 formal support — **Nov. '99**
  - ⇒ interagency agreement is in preparation — **April '00**
- **International agreement**
  - international agreement (LOA) in preparation, — **May '00**
  - commitment: deliver the CAL mech. structure, pre-electronics mechanical assembly, AFEE asic

    ≈22.6 M€ (A-D) + 10.2 M€ (E)
  - science commitments: software (instr+science), source catalogue, science data center mirror site
- **organization chart**

# FRENCH ORGANIZATION CHART



# CAL MECHANICAL STRUCTURE

- **ENGINEERING MODEL 1** **(nov '99)**
  - low level sine wave 5-2000 Hz @ 0.25g along 3 axes (beginning & end)
  - random vib. 20-2000 Hz (std) along 3 axes
    - tightening system safe, same signature before & after random vib.
    - no degradation of the CsI surface
    - $\nu$(CsI long. mode) ~ 400 Hz
- **ENGINEERING MODEL 2** **(summer '00)**
  - 8 x 12 cells (glued), AO dimensions, CsI + dummies, optical walls
  - pressure caps for optical silicon pads

    $\Rightarrow$ vibration tests
- **ENGINEERING MODEL 3** **(autumn '00 -- PDR)**
  - 8 x 12 cells (block), final dimensions, CsI, final optical walls and caps

    $\Rightarrow$ qualification tests

# Vibration test

- Check Xal tightening system: rubber bands at log edges
- Check if Xal surface not damaged inside the cell

**Test set-up**

- 1 Crismatec polished Xtal 30x23x370 $mm^3$ with home made ~1mm chamfers
- 2 dummies with same density (aluminum and steel)
- 3 cells composite structure closed with aluminum caps and a 1 mm thick silicon spacer (0.4mm walls)
- 4 rubber cords $\phi$1mm
- Clearance between crystal and walls 0.2 to 0.4mm

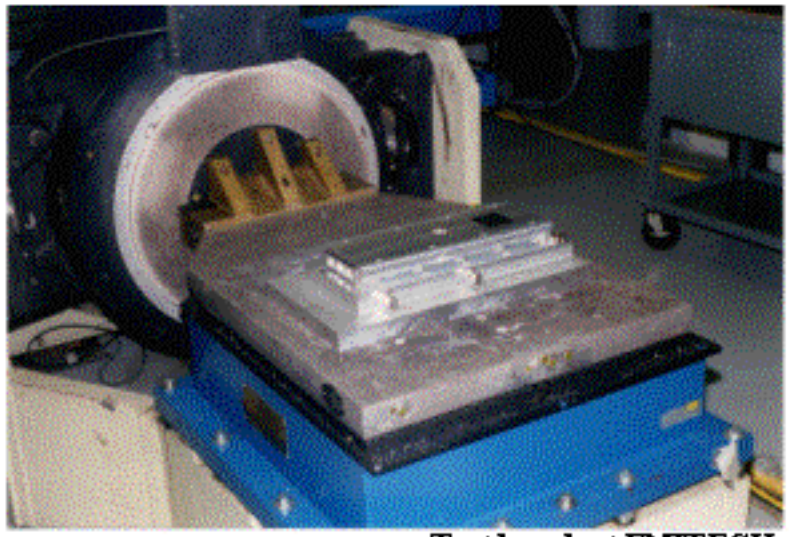
**Vibration test levels**

Low level sine vibrations 3 axis: 5 to 2000Hz at 0.25g

Random vibrations 3 axis:

| | | |
|---|---|---|
| 20Hz | | 0.026$g^2$/Hz |
| 20 to 50Hz | | +6dB/oct |
| 50 - 800Hz | | 0.16$g^2$/Hz |
| 800 - 2000Hz | | -6dB/oct |
| 2000Hz | | 0.026$g^2$/Hz |

Low level sine vibrations 3 axis: 5 to 2000Hz at 0.25g



**Test bench at EMITECH**

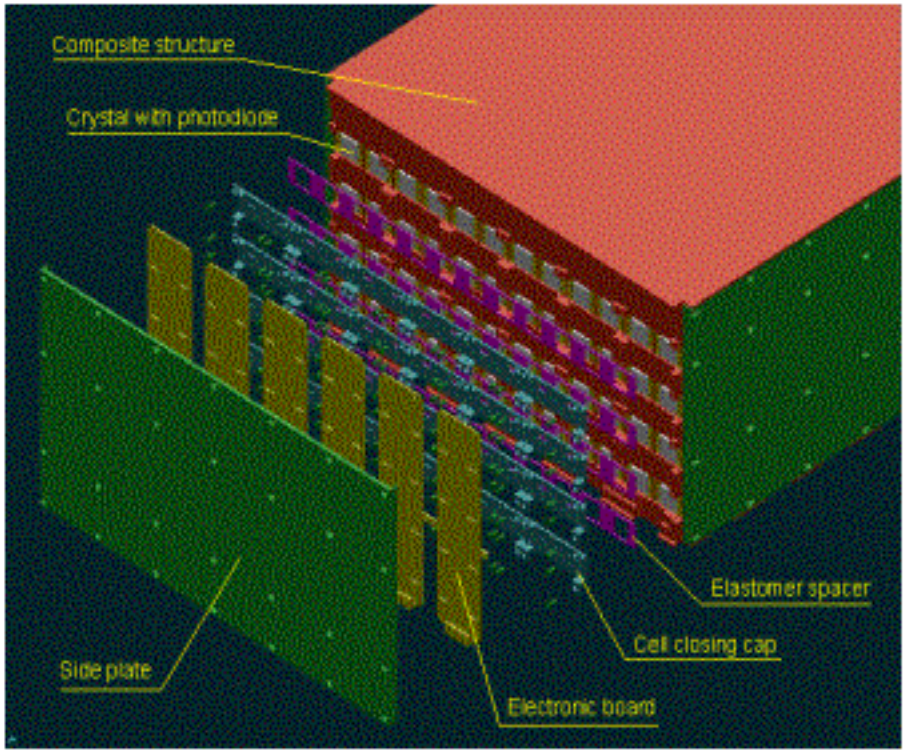
**Test results**

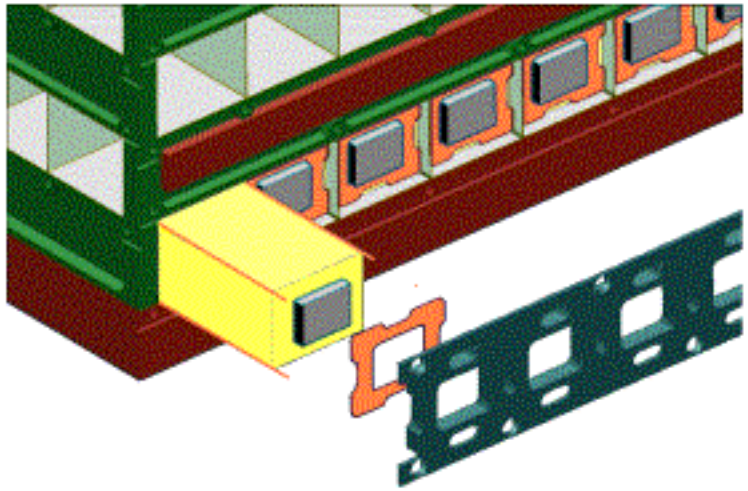
- Lower natural frequency measured 400Hz transverse to structure
- No visible degradation of the crystal surface
- No evolution of the system after random vibrations

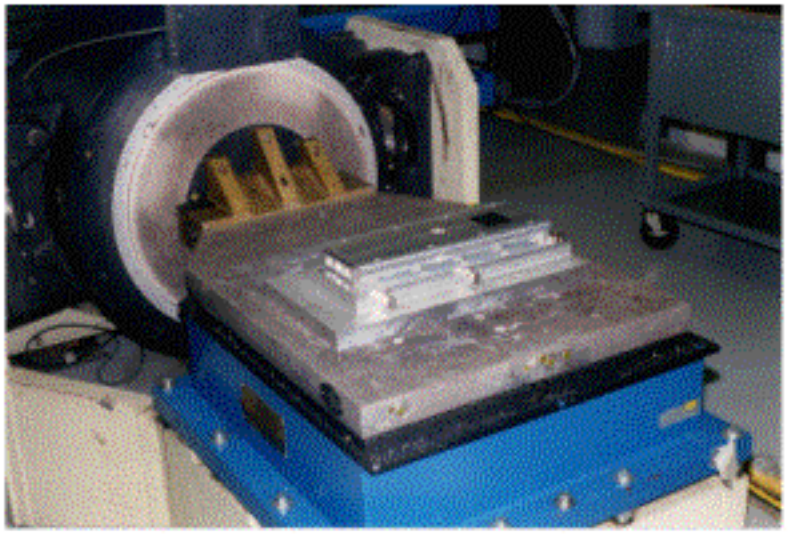
*Xal optical properties not measured prior to test (optical test bench not yet ready) but still the best light yield of all logs at Ecole Polytechnique.*

**New test foreseen with final optical reflector**

# CAL mechanical structure



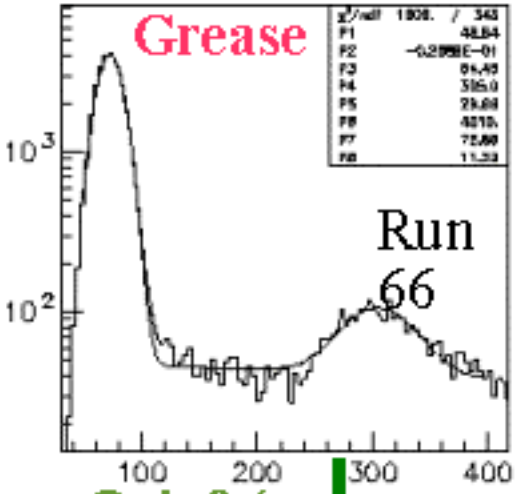



# Light yield studies

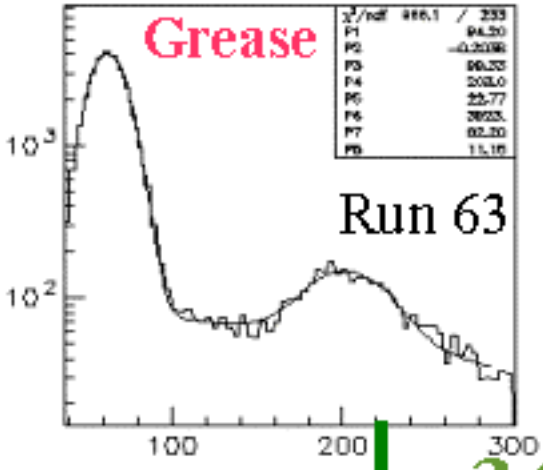
- **test stations operational**
  - with μ, sources, positioning accuracy of 1 cm (CEA), 1 mm (X)
  - 3 Xals or cells, diodes, calibrated readout electronics
  - controlled pressure tests for optical pads in near future
  - MONICA: diffusivity/reflectivity measurements of lining
- **lightyield vs. lining in C-cell**
  - final estimates **May '00**
- **lightyield vs. vibrations**
  - 1 cell with CsI and opt. walls, vib. tests **June '00**
- **lightyield reproducibility**
  - eng. model 2, with <10 CsI Xals, vib. tests **summer '00**
- **optical joint** **ongoing**
  - testing various silicon pads, lightyield vs. cap pressure, cap closure
  - || gluing solutions

# Light yield studies

## Thick Tyvek +alu+ white ends



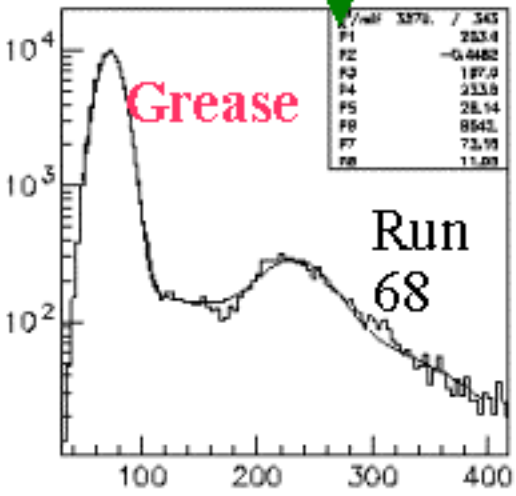

- 40 %



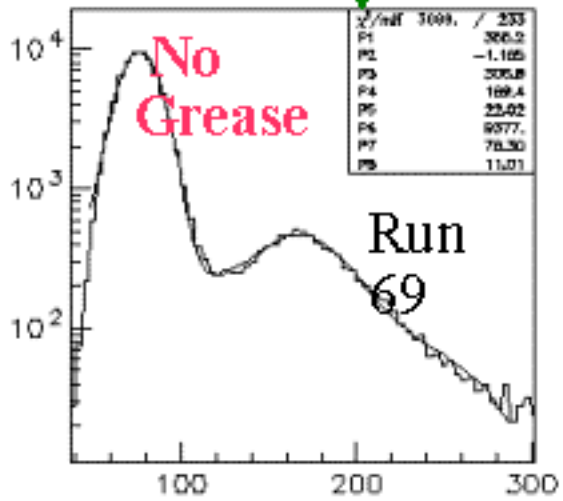

- 34 %

## Al. Mylar + white ends

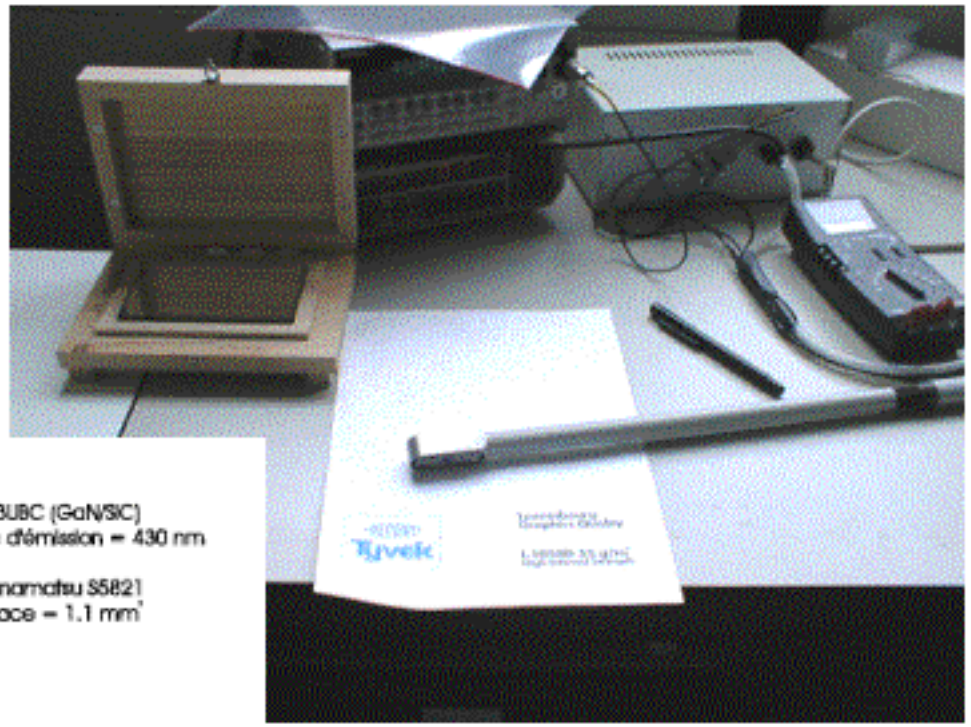
- 34 %

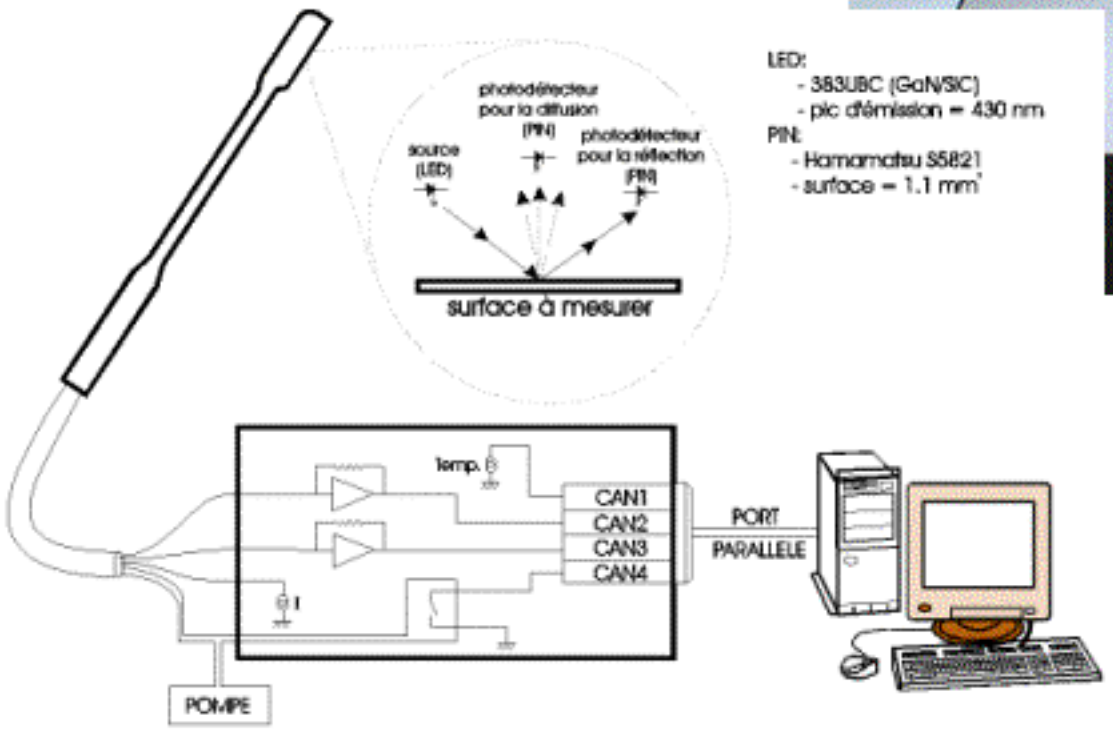



- 39 %



# MONICA






LED:
- 383UBC (GaN/SiC)
- pic d'émission = 430 nm

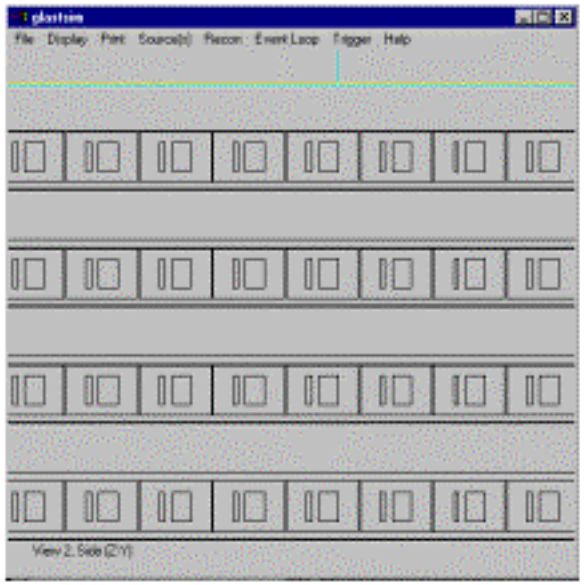
PIN:
- Hamamatsu S5821
- surface = 1.1 mm²

# Asic development

- meeting CAL electrical architecture — **Feb. '00**
- specs — ready ≤ June '00 ⇒ architecture review in — **Aug. '00**
  - optimization of energy bands
- asic design review — **Dec. '00**
- development schedule
  - start in June '00
  - too tight schedule: run #1 in Feb. '01, run #2 in Sept. '01
    ⇒ 5 more months (submission dates, more testing)
  - characterized chips and corrections for the « flight » run ready for CDR
  - BUT run #2 chips to be delivered for BTEM March 1st '02
    ⇒ 3 or 4 months late for BTEM delivery

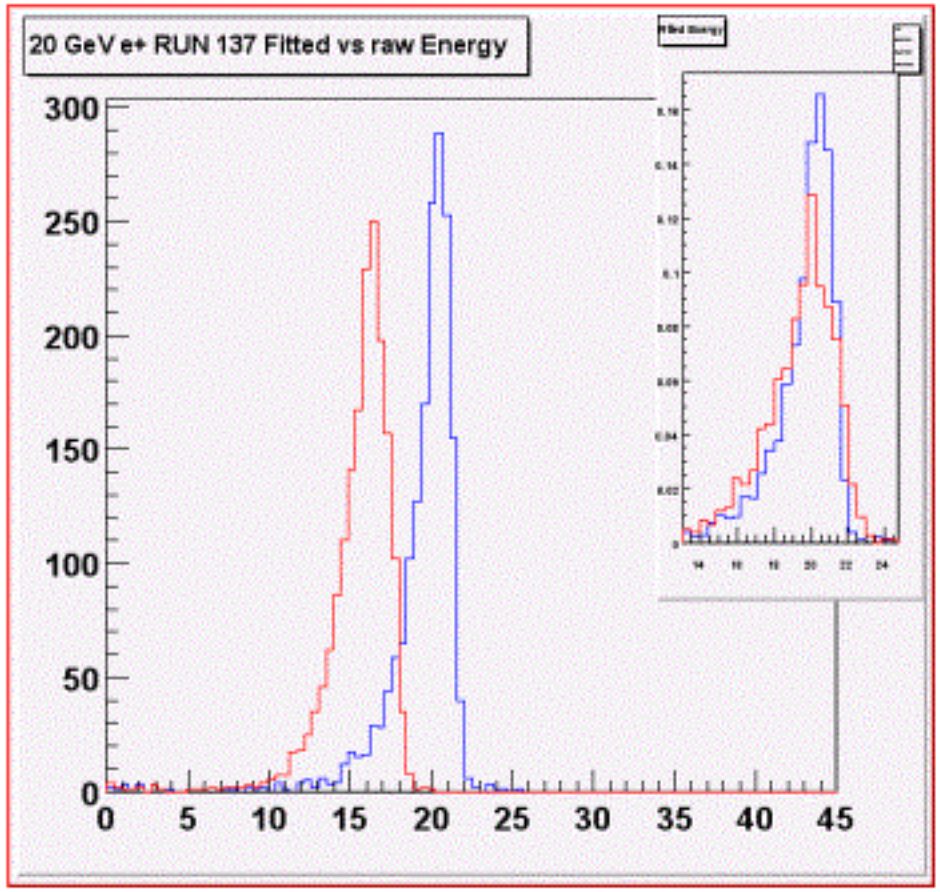
# Software

- simulation activities: optimization of CAL design
  - more realistic CAL description
    - energy deposition in diodes
    - noise
    - asymetry…
    - Xal to Xal energy gain dispersion for calibration studies
  - readout threshold 2-5 MeV



# Software

- **Energy reconstruction algorithms**
  - profile fitting ok,
  - low energy, cracks, …
- **lightyield optical simulations**
  - light propagation in CsI, air gap, optical walls, opt. joint
  - running
- **near future**
  - TKR/CAL feedback




**summer '00**