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

Mar-00

CNES – CEA – IN2P3
French collaboration

- **Interagency Agreement**
  - CNES, CEA, and IN2P3 formal support
    - interagency agreement is in preparation
  - Nov. ’99
  - April ’00

- **International Agreement**
  - international agreement (LOA) in preparation,
    - May ’00
  - commitment: deliver the CAL mech. structure, pre-electronics mechanical assembly, AFEA ASIC
    - \( \approx 22.6 \text{ M}\€ \text{ (A-D)} + 10.2 \text{ M}\€ \text{ (E)} \)
  - science commitments: software (instr+science), source catalogue, science data center mirror site

- **Organization Chart**

Mar-00
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
  - v(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
  ⇒ Vibration tests

**Engineering Model 3** (Autumn '00 -- PDR)
- 8 x 12 cells (block), final dimensions, CsI, final optical walls and caps
  ⇒ 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 mm³ 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 φ1mm
- 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 0.026g²/Hz
20 to 50Hz +6dB/oct
50 - 800Hz 0.16g²/Hz
800 - 2000Hz -6dB/oct
2000Hz 0.026g²/Hz
Low level sine vibrations 3 axis: 5 to 2000Hz at 0.25g

**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

Mar-00
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

- **Light yield vs. lining in C-cell**
  - final estimates May ’00

- **Light yield vs. vibrations**
  - 1 cell with CsI and opt. walls, vib. tests June ‘00

- **Light yield reproducibility**
  - eng. model 2, with <10 CsI Xals, vib. tests summer ’00

- **Optical joint**
  - ongoing
  - testing various silicon pads, light yield vs. cap pressure, cap closure
  - gluing solutions

Mar-00
Light yield studies

Thick Tyvek +alu+ white ends

- Grease Run 66 - 40%

- 34%

Al. Mylar + white ends

- Grease Run 68 - 39%

- 34%

No Grease Run 63

No Grease Run 69
Monica

LED:
- 383 UBC (GaNSC)
- pic d'émisssion = 430 nm
- PIN:
- Hamamatsu S8821
- 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

Mar-00
Simulation Activities: Optimization of CAL Design

- More realistic CAL description
  - Energy deposition in diodes
  - Noise
  - Asymmetry...
  - Xal to Xal energy gain dispersion for calibration studies

- Readout threshold 2-5 MeV
Software

- **Energy Reconstruction Algorithms**
  - profile fitting ok,
  - low energy, cracks, ...

- **Light Yield Optical Simulations**
  - light propagation in CsI, air gap, optical walls, opt. joint
  - running

- **Near Future**
  - TKR/CAL feedback

Summer '00

Mar-00