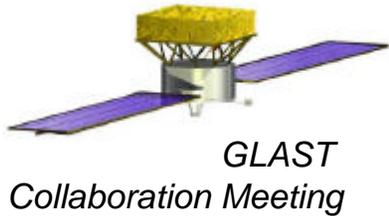


*GLAST
Collaboration Meeting*

*Calorimeter Status
9 - 10 Sept. 1998*

GLAST Calorimeter Development Status September 9, 1998

W. Neil Johnson
Naval Research Lab

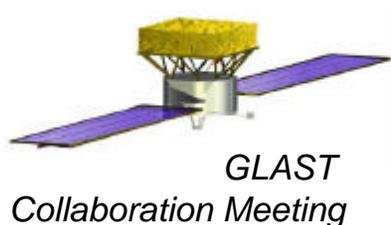


GIDSC-Approved Modifications to Calorimeter Requirements

*Calorimeter Status
9 - 10 Sept. 1998*

- ❑ Adjust calorimeter gain scales to achieve 100 GeV upper energy range in a single CsI block. This is of primary importance for spectroscopy of side-entering gammas.
- ❑ Calorimeter-only > 1 MeV spectroscopy for Gamma Ray Bursts is not part of the baseline design. It causes significant complexity in calorimeter deadtime measurement and problems with response to L1 triggers.
- ❑ Relief from 1 MeV threshold for calorimeter spectroscopy. Design will attempt to achieve lowest possible threshold, not to exceed 5 MeV

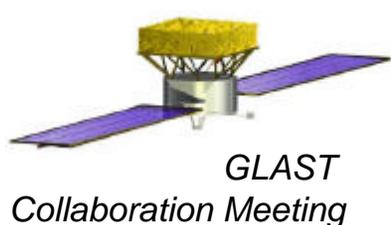
The increase in low energy threshold permits CsI crystal wrapping techniques and light tapering which may improve the uniformity of energy measurement along the length of the CsI block. The new electronics design will work to 5,000 e^-/MeV rather than the previous 10,000 e^-/MeV .



STCU CsI Detector Procurement

*Calorimeter Status
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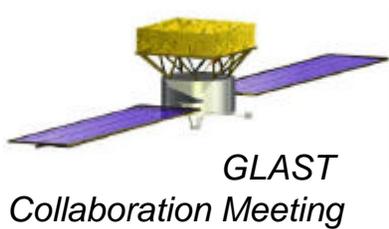
- ❑ Proposal to the Science Technology Center Ukraine to provide CsI detectors for GLAST has been approved for \$50K support from US State Dept. This will provide
 - 50 detectors, 310 x 30 x 23 mm
 - 10 detectors, 400 x 30 x 23 mm
- ❑ Potential options for funding by other countries and for 2nd year of funding.
- ❑ Schedule / Status
 - Difficult to determine exact status, but Karkov Institute is ready to make material
 - Ukrainians should have provided SOW last week
 - Hope to have contracts in place by end of the month
 - First material could then arrive by January, 1999.



Crimatec CsI Detector Procurement

*Calorimeter Status
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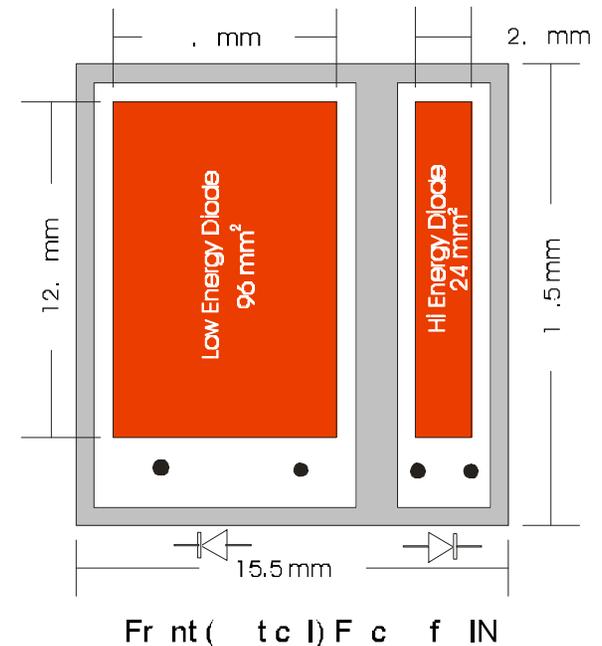
- ❑ Remainder of CsI for BeamTest '99 calorimeter will be procured by SLAC/Stanford using the BaBar contracts and expertise.
- ❑ Crimatec has created sample detectors of various sizes and measured uniformity. Measurements with polished crystals similar to results of NRL testing.
- ❑ Questions remain on surface treatment. Meeting with SLAC and Crimatec needed to finalize specifications.
- ❑ Procurement should be initiated by November 1st to meet schedule.

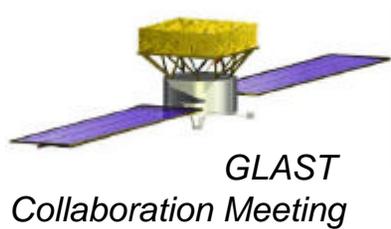


Custom PIN Photodiode

Calorimeter Status
9 - 10 Sept. 1998

- ❑ The design for the dual PIN photodiode for GLAST has been completed with Hamamatsu.
 - Package is 15.5 mm x 16.5 mm ceramic carrier
 - Large diode area - 96 mm²
 - Small diode area - 24 mm²
- ❑ Ceramic carrier has been selected for lowest noise and cross-talk
- ❑ Non-recurrent engineering cost much larger than anticipated due to ceramic carrier (\$40k)
- ❑ Unit cost, in small quantities, was correctly estimated.
- ❑ Schedule: 3 months ARO; no order placed yet.

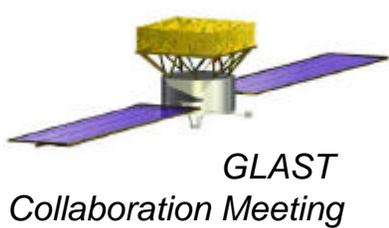




Custom ASIC Development

*Calorimeter Status
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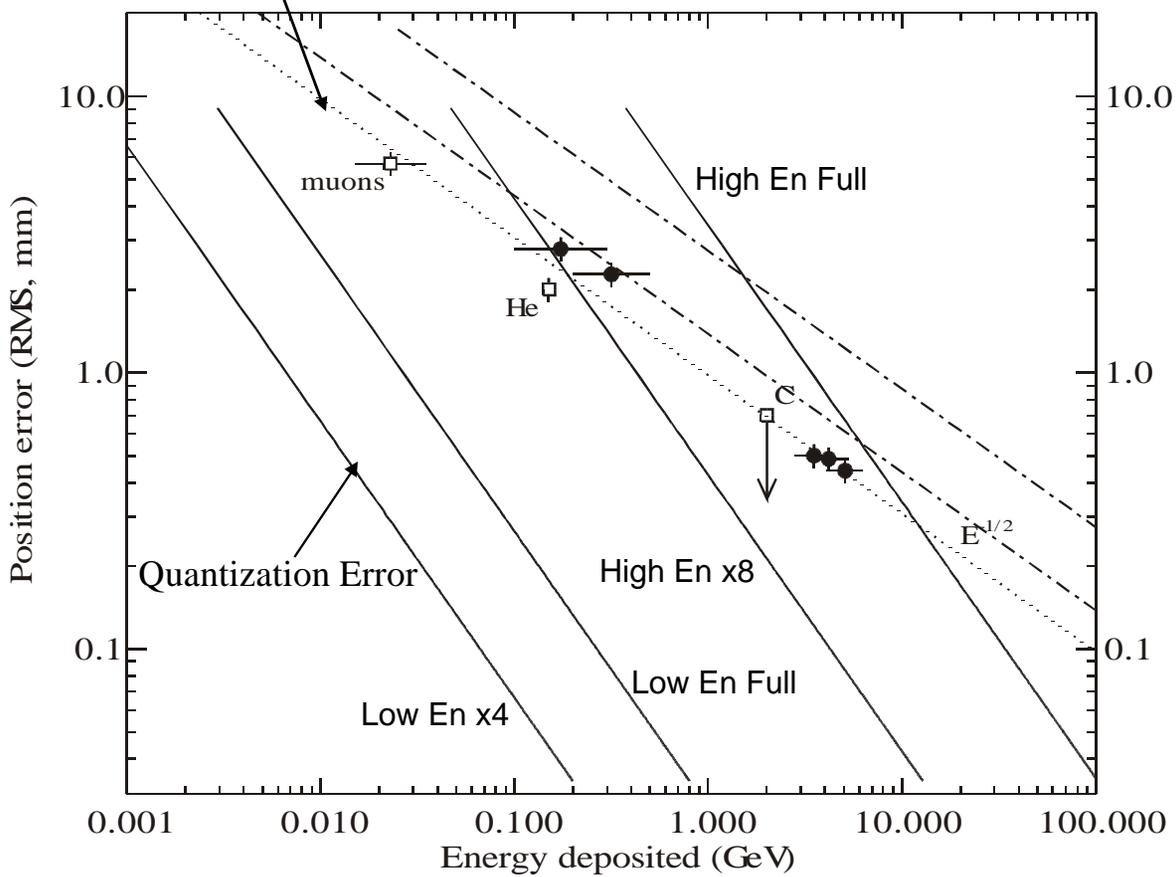
- ❑ As recommended at the Calorimeter Electronics Review (June, '98), the ASIC design has been moved from the HP 0.5 μm process to the ORBIT 1.2 μm 5V process.
- ❑ This design change has been more than a full time job for Satpal Singh at GSFC. In the process, we have
 - revisited the performance requirements of the calorimeter front end
 - implemented the gain scales to achieve 100 GeV upper energy range
 - considered the mechanical configuration to minimize cross-talk in PIN to ASIC connections.
- ❑ The ASIC development schedule is incorporated in the Cal. Beamtest schedule.
 - Decision has been made to support beamtest with one ASIC per block end.
 - Fallback position and decision points are being developed.
 - First submission to ORBIT will be 16 September.
 - 2nd submission is for V-I and I-V converters



Revised Energy Ranges

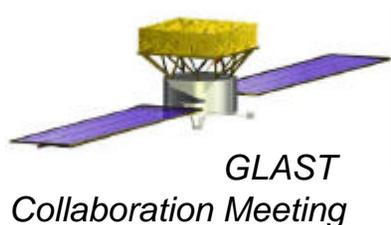
Calorimeter Status
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Measured Light Statistics Error



Four Energy Ranges

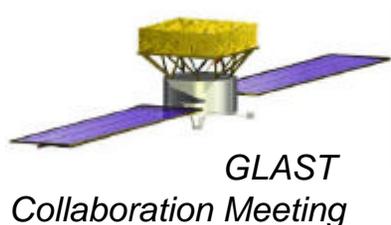
- Low Energy Range
 - x4, 2 - 200 MeV
 - Full, 200 - 800 MeV
- High Energy Range
 - x8, 0.8 - 13 GeV
 - Full, 13 - 102 GeV



Detector Packaging / Light Collection Properties

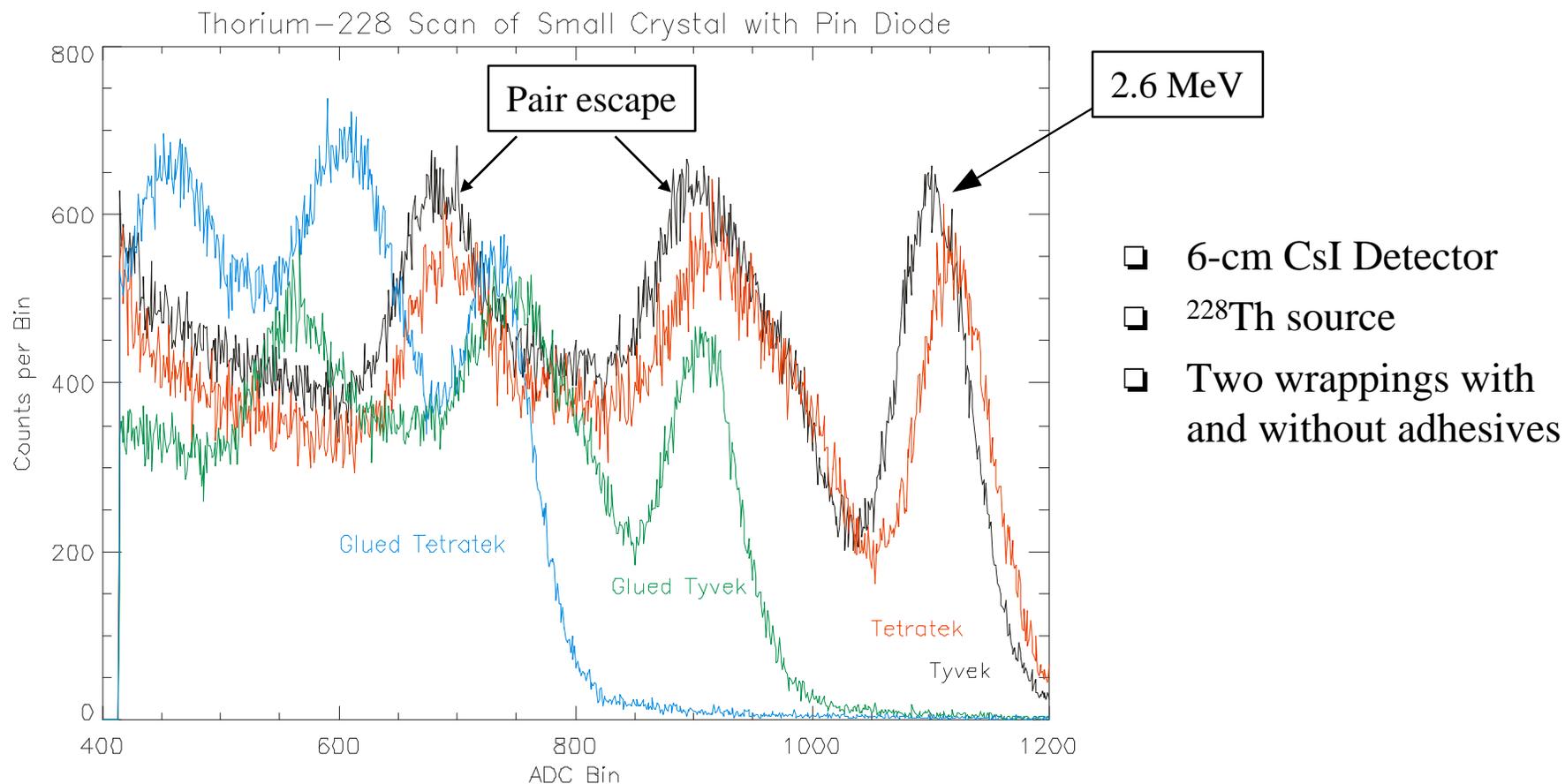
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- Study of light collection impact of various crystal wrapping techniques:
 - treatment of CsI block ends vs light output
 - Paints
 - Wraps - Tyvek and Tetrtek
 - Laminates
 - Tyvek & Tetrtek laminated with Aluminized mylar
 - laminates attached to crystals with adhesives
 - * Paints are out, laminates show promise
- Study of compressive load impact on light collection for various wrapping techniques
 - * Short-term loss not significant, longer tests in progress



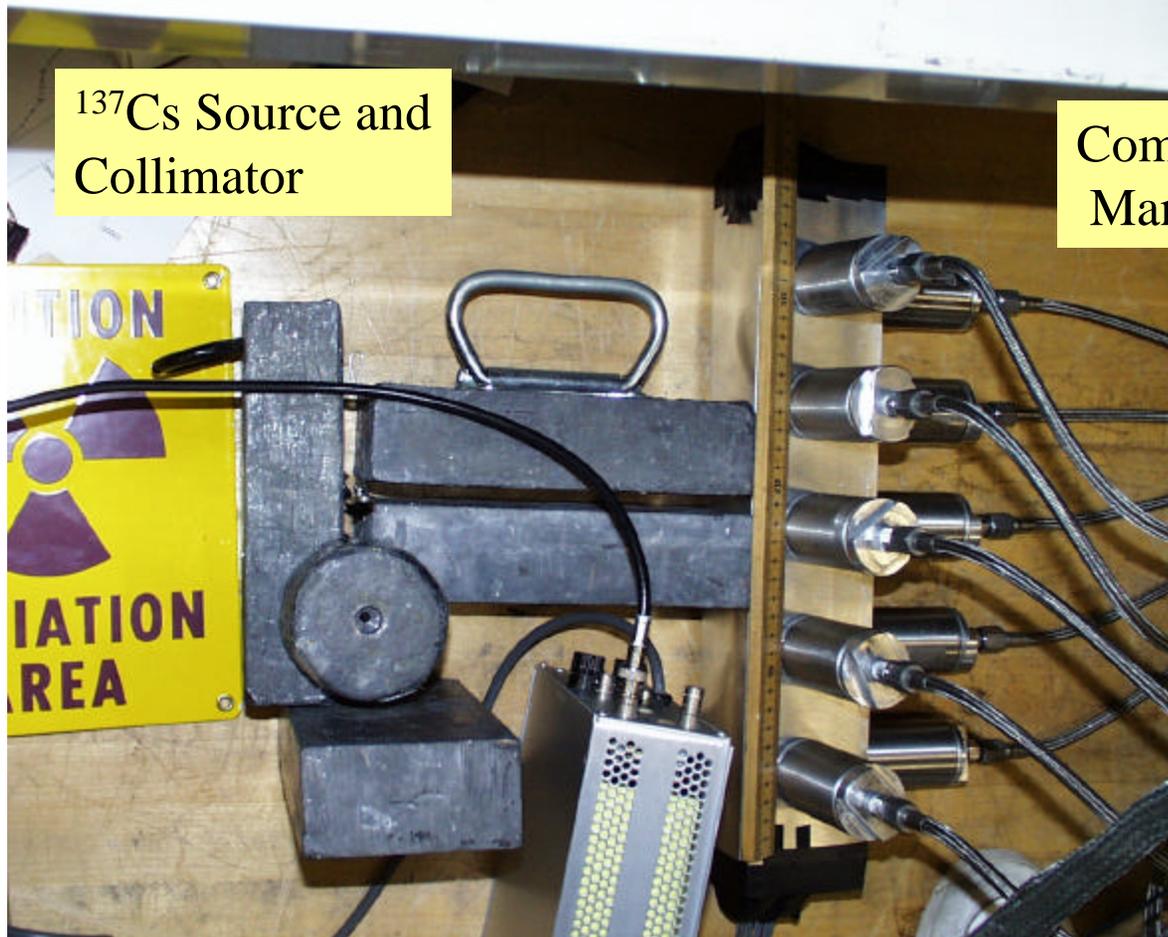
CsI Light Collection vs. Wrapping Techniques

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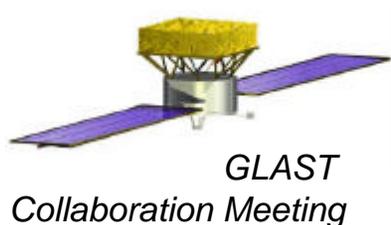


Detector Light Collection Test Unit

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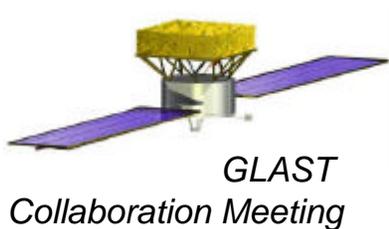
- ❑ 36 cm detector viewed by PMT
- ❑ Crystal scanned by ^{137}Cs source in Pb collimator
- ❑ Compression controlled by regulator and high pressure Nitrogen



CERN Beam Test, July '98

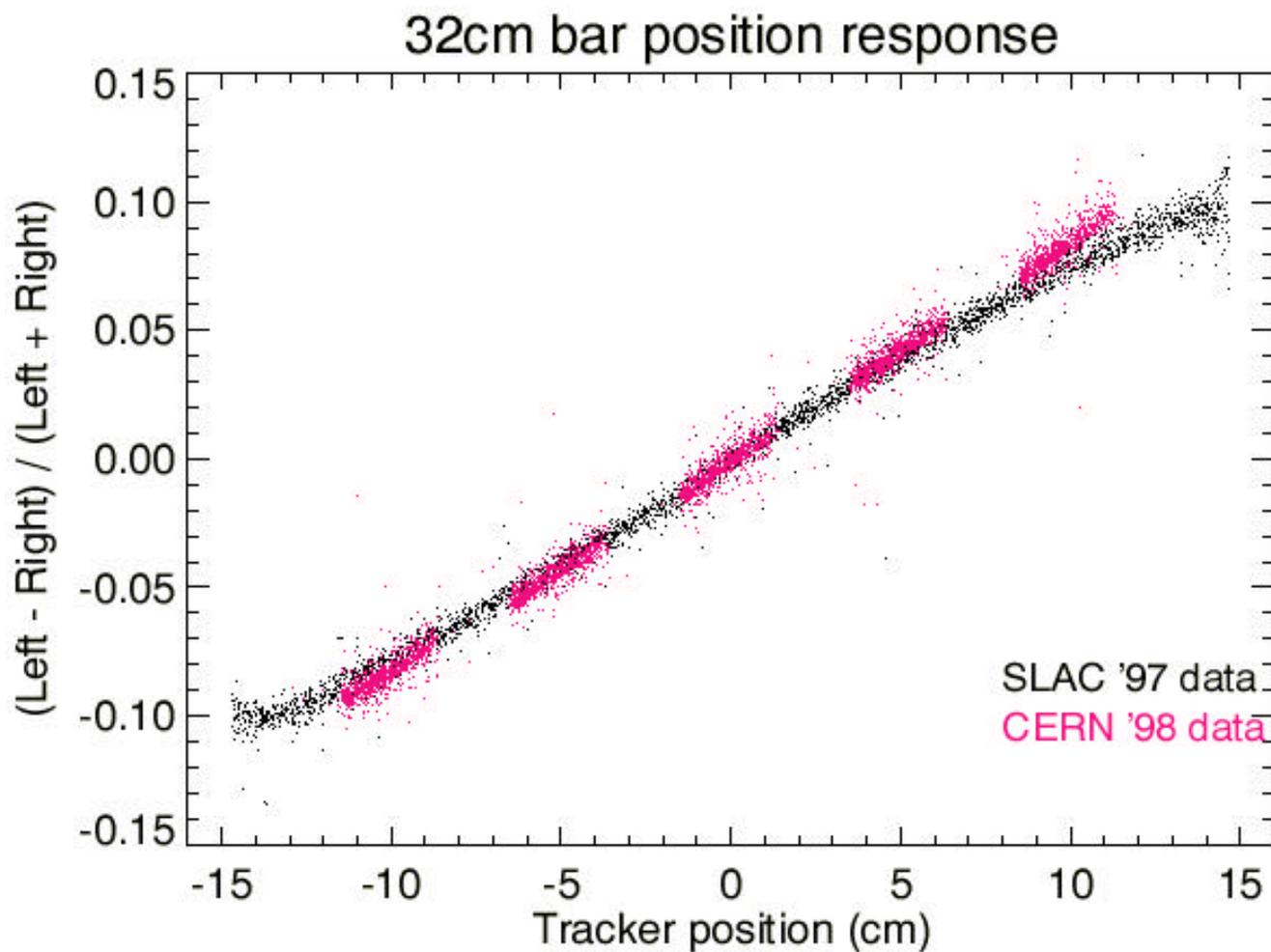
*Calorimeter Status
9 - 10 Sept. 1998*

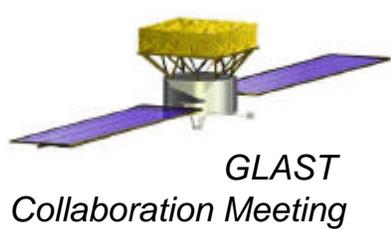
- ❑ NRL participated in the July Beam Test at CERN by providing a test configuration:
 - 1 detector, 25 x 30 x 320 mm, w/ 2 PINs on each end (1 cm² & 0.25 cm²)
 - 4 detectors, 15 x 15 x 190 mm
 - eV Products preamps
 - NIM/Camac shaping amps and ADCs
- ❑ NRL Test Objectives
 - Verify energy and position resolution of large PINs are similar to SLAC '97 performance.
 - Study performance of small PINs relative to large PINs and verify scaling relations
 - Study energy and position resolution for beams at incidence angles far from normal.
- ❑ First data products have just arrived from Europe. Thanks to the hard work of Patrick, Guido and their teams, it appears that the tests were successful.



CERN Beam Test '98

Calorimeter Status
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Summary

*Calorimeter Status
9 - 10 Sept. 1998*

- ❑ Significant progress has been made in understanding the design issues
- ❑ Meeting the schedule for Beam Test '99 will be a challenge
 - critical path centered on the development cycle for the ASIC
 - mechanical design and testing of the compression cell is also a concern
 - must get PIN and CsI procurements initiated this month