

Saclay, France
10 - 11 Dec. 1998

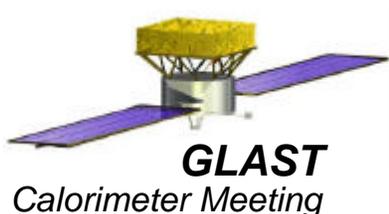
GLAST Calorimeter

Crystals, PIN-diodes, epoxies, wrappers, etc.

Dec 10, 1998

Bernard Philips
Naval Research Lab

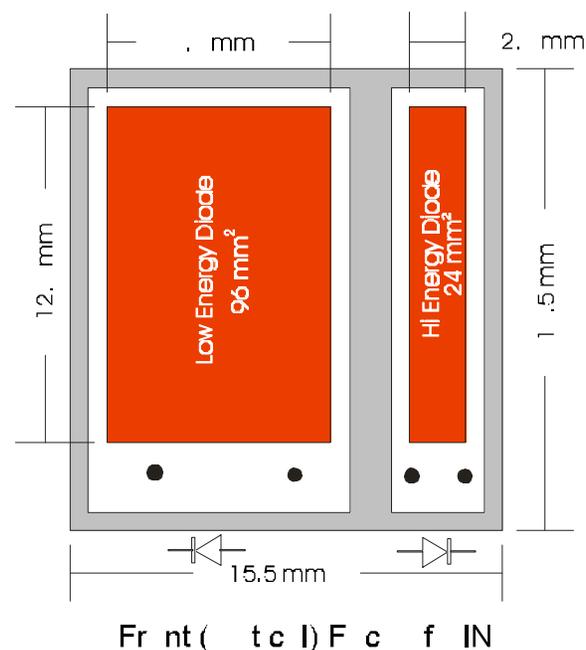


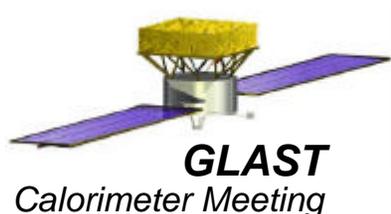


PIN diodes

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- ❑ 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
- ❑ Schedule: 3 months ARO; order finally placed through Hiroshima (delivery Feb. 99).





Wrappings

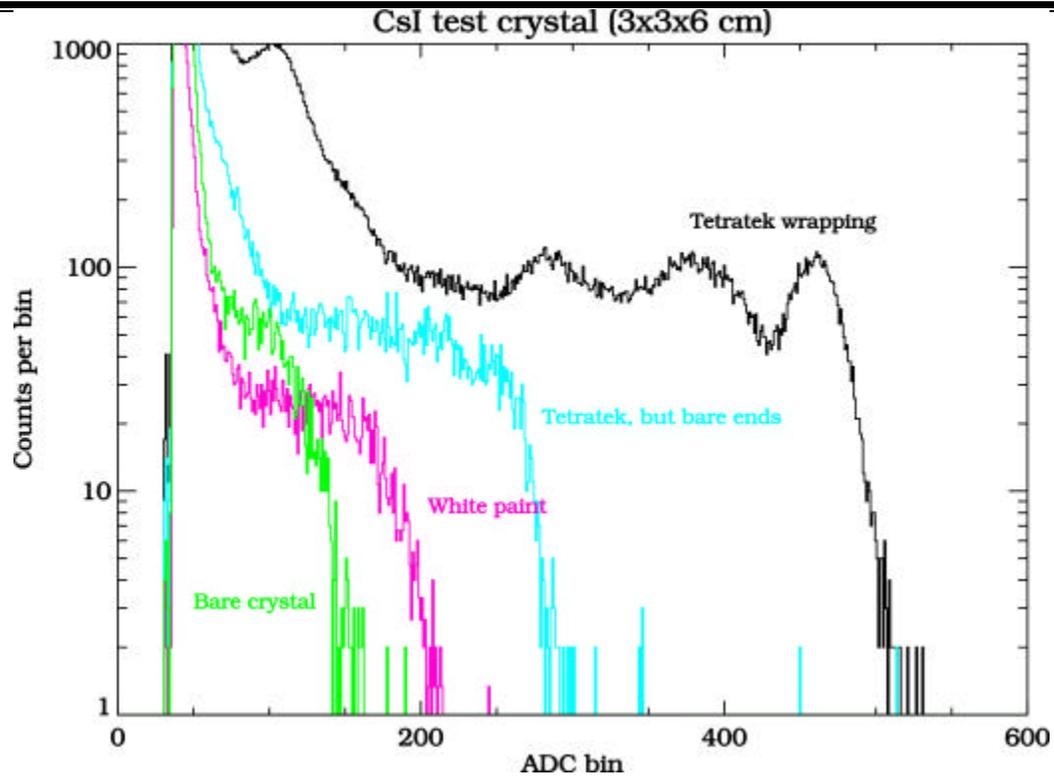
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- ❑ Study of light collection impact of various crystal wrapping techniques:
 - treatment of CsI block ends vs light output
 - Tyvek, Tetratek, and paints
 - Tyvek & Tetratek laminated with Aluminized mylar
 - laminates attached to crystals with adhesives
 - * Paints are out, laminates show promise
- ❑ Shake test performed with Tyvek, Tetratek and laminate with adhesive
 - * slippage with Tyvek (coeff. of friction is ~ 0.16 , need >0.5)
- ❑ Study of compressive load impact on light collection for various wrapping techniques
 - * Short-term loss not significant, longer tests in progress



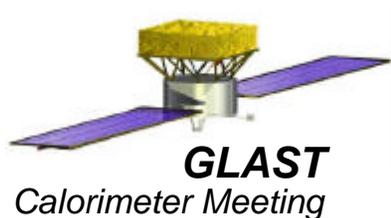
Paints/wraps

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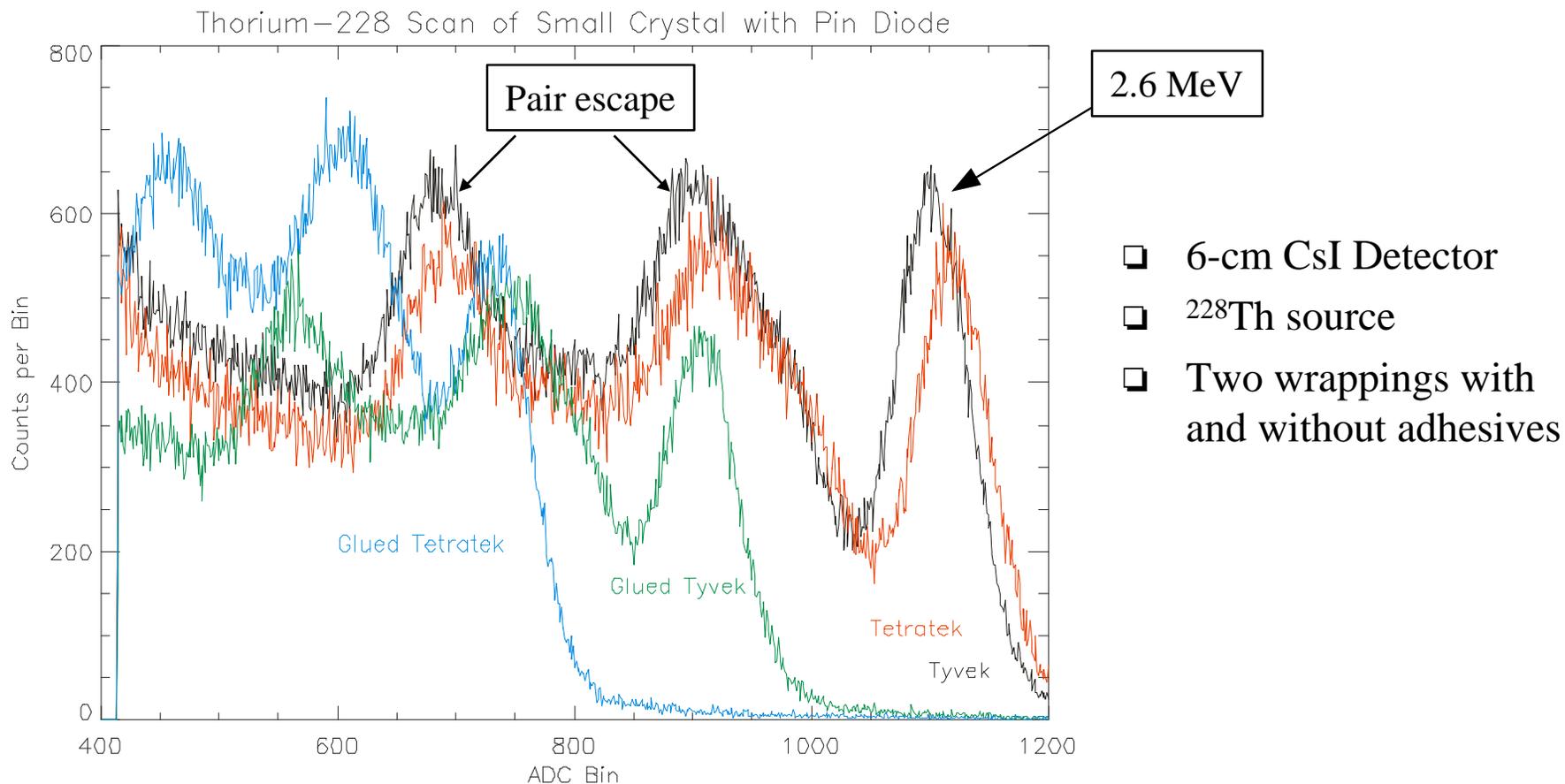
- Tests on 3x3x6 cm log with 1 cm² PIN diode

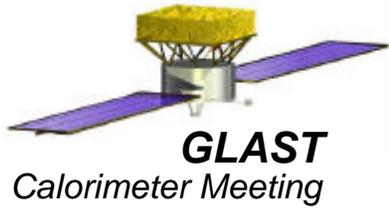




CsI Light Collection vs. Wrapping Techniques

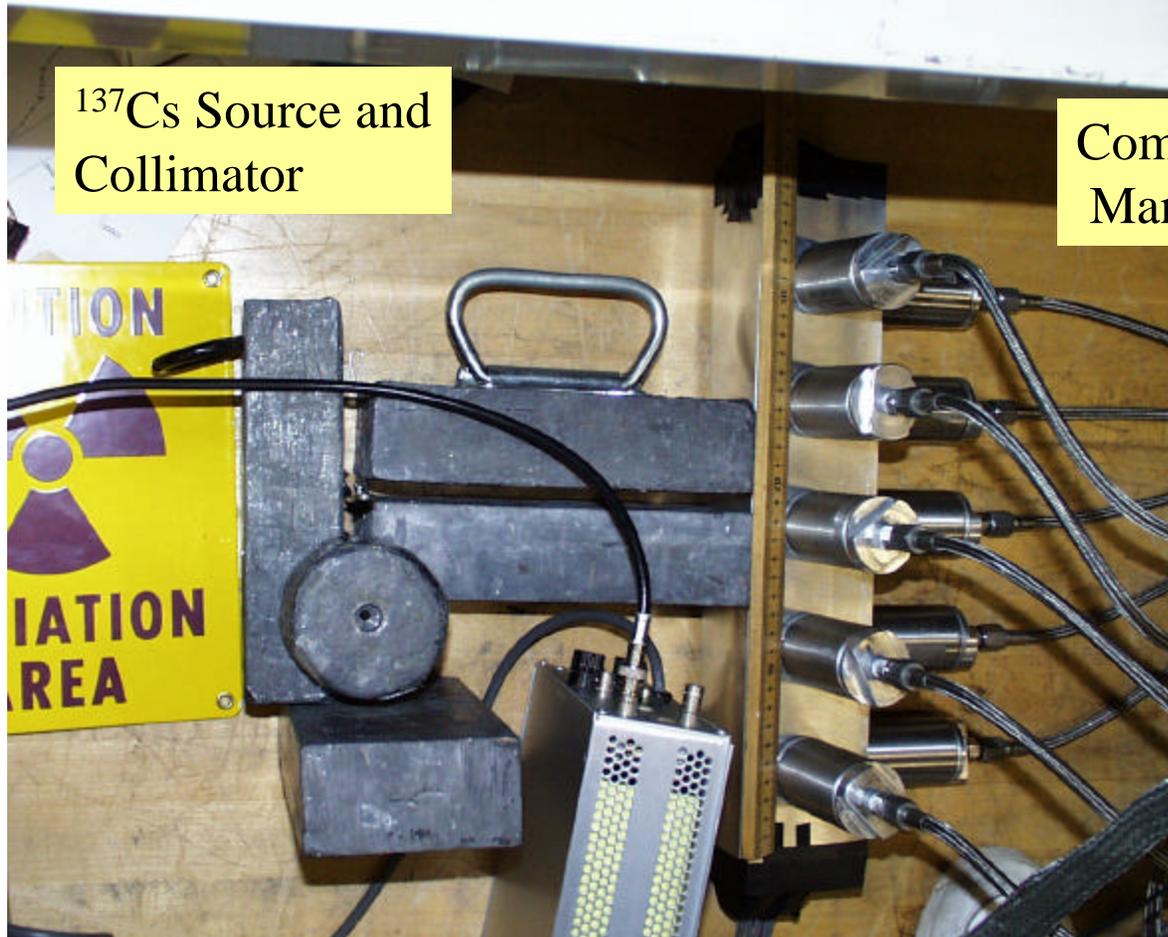
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Detector Light Collection Test Unit

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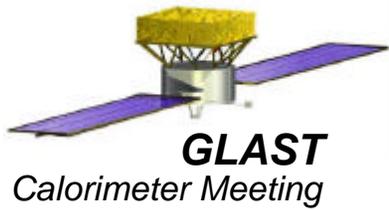


^{137}Cs Source and
Collimator

Compression
Manifold

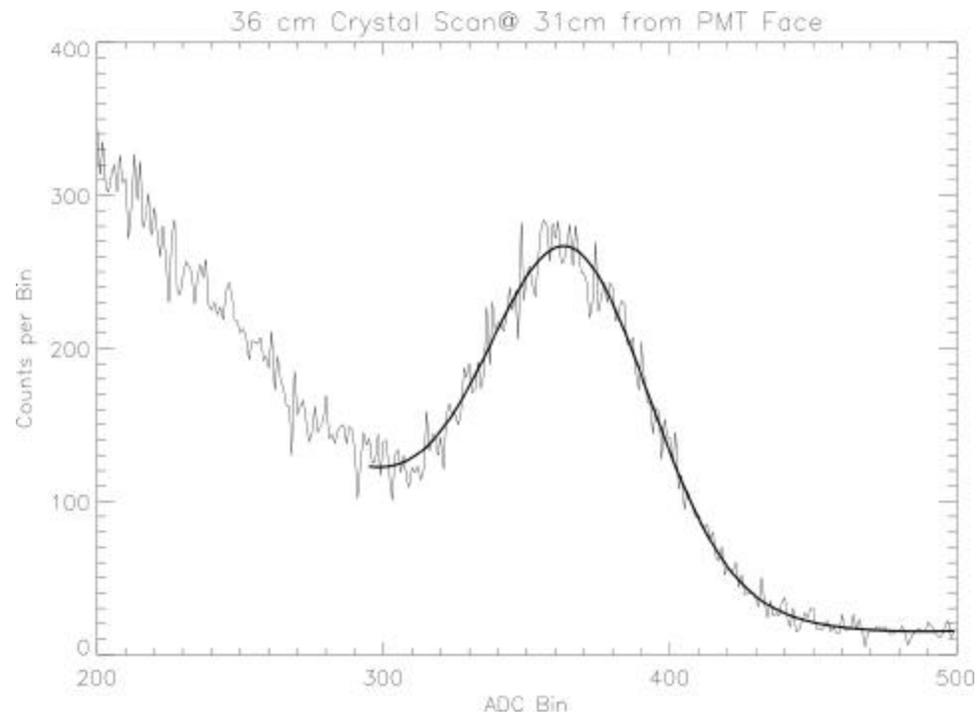
- ❑ 36 cm detector viewed by PMT
- ❑ Crystal scanned by ^{137}Cs source in Pb collimator
- ❑ Compression controlled by regulator and high pressure Nitrogen





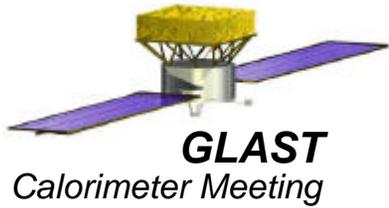
Pressure Test Data

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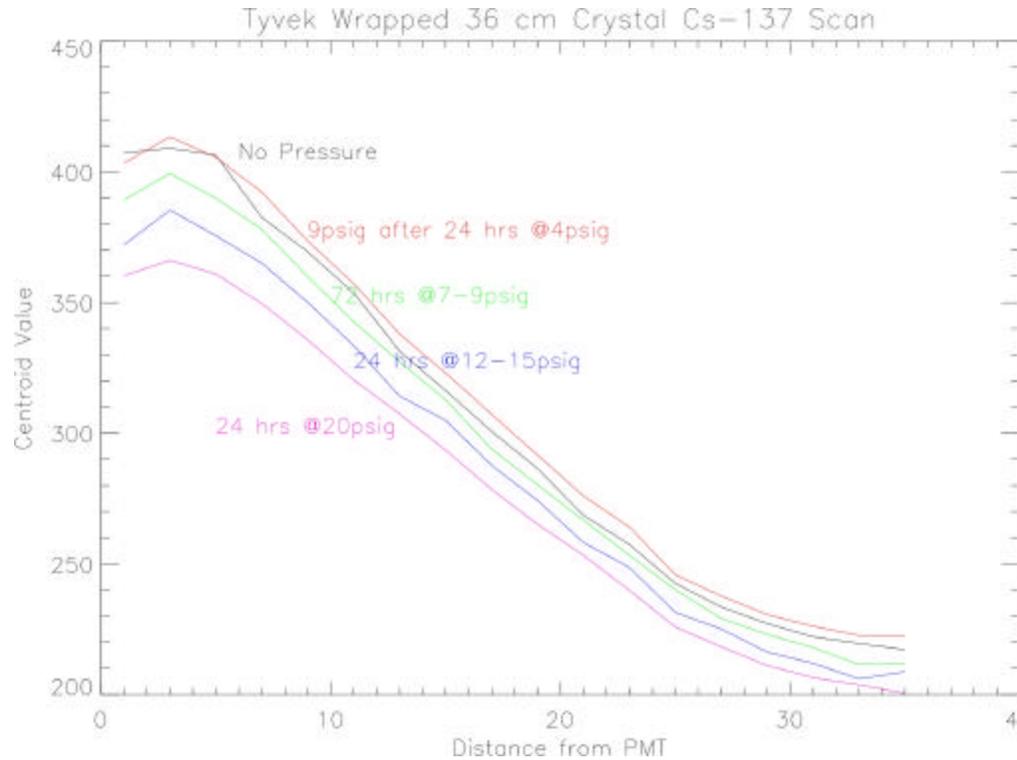
- Fit peak at 662 keV and map centroid versus position along crystal





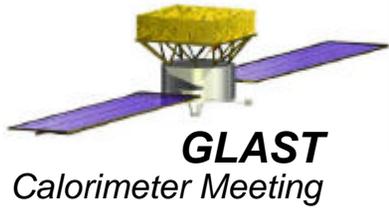
Pressure Test Results

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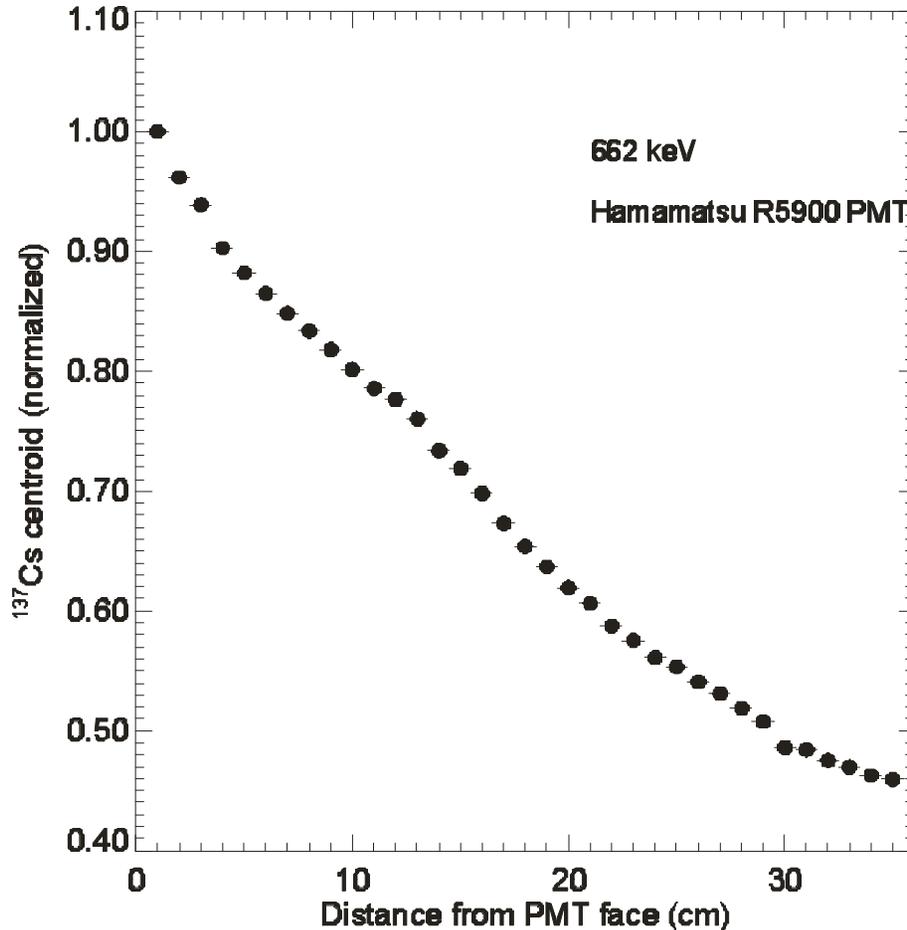
- ❑ Losses due to pressure not very large
- ❑ Long term effect TBD





High statistics scan along crystal

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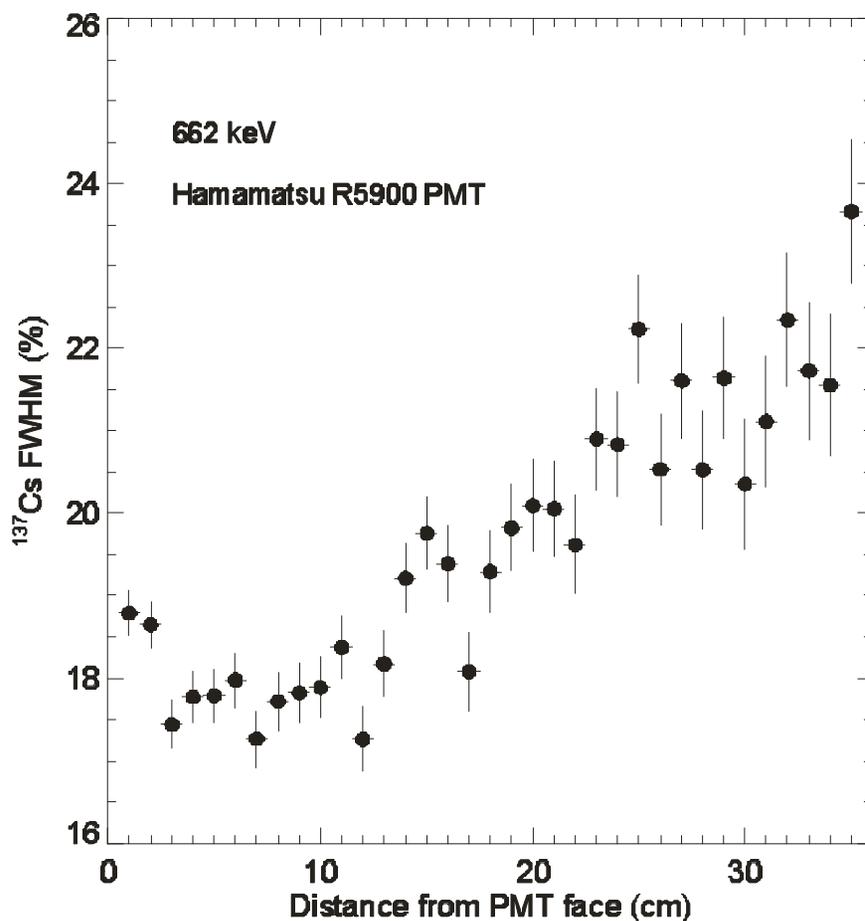


- Different from last plots because full face exposed
- “Hotspot” at ~13 cm: real, ~2-3 percent effect similar to Babar hotspots
- Overall curve is smooth
- Done early during pressure test: week-end at ~30 cm.



Energy resolution

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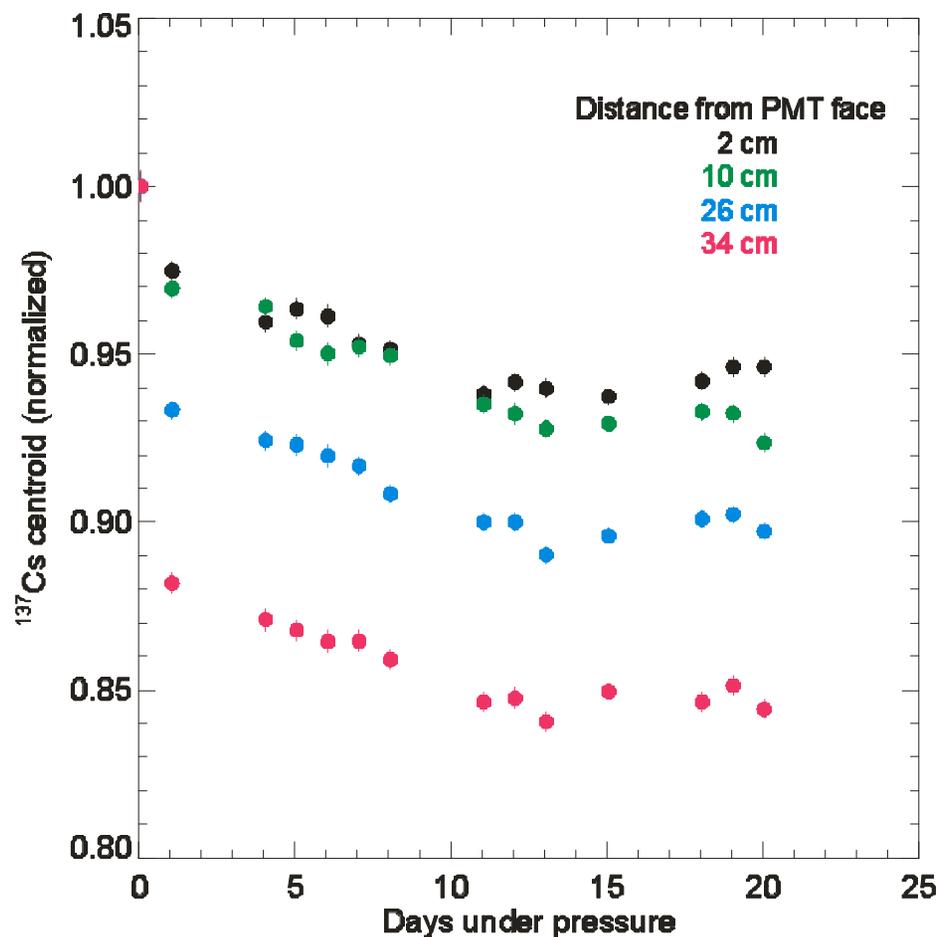


- Measured with PMT on one end; other end blackened,
- Better resolution possible with white end or 2 PMTs
- Typical of QA measurement expected at delivery
- Obviously will not achieve this with PIN-diodes



Long-term Pressure Tests

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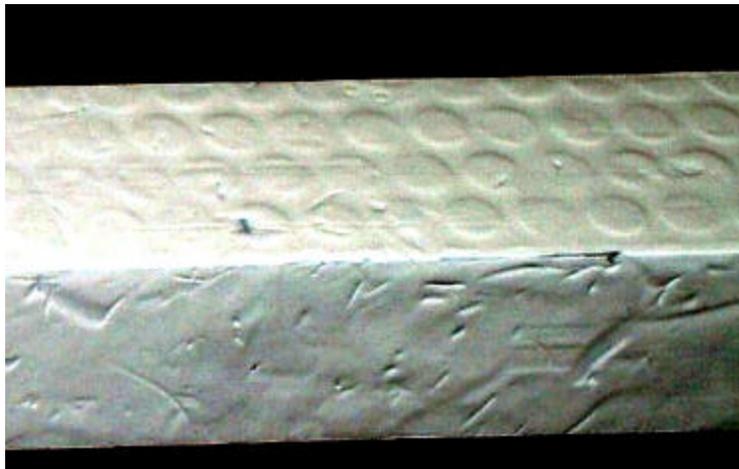


- All curves normalized to first measurement
- light yield after 1 day ~equal to zero pressure light yield
- Light yield seems to settle down after 1-2 weeks
- If stable after ~1 month, no significant light loss
- Will continue monitoring for long term effect



Post-shake wrapping

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- Compression against rubber left imprint in white wrapper
- Crystal not affected
- Light yield not affected

Consider:- rethinking patterns in rubber

- add pusher plate
- use imprint



PIN-diode to crystal joint

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1.5 mm

Technical Issues: -no spillage
-no bubbles
-reproducible
-ease of application

Task: -to hold PIN diode on crystal
-to optically couple PIN-diode
to CsI crystal

Properties: -clarity
-index of refraction
-space qualified
-radiation tolerant

Solution:- 3-4 epoxies identified
- tests have started
-no problems anticipated

