

Glue Test Results

Dr. Kevin Giovanetti

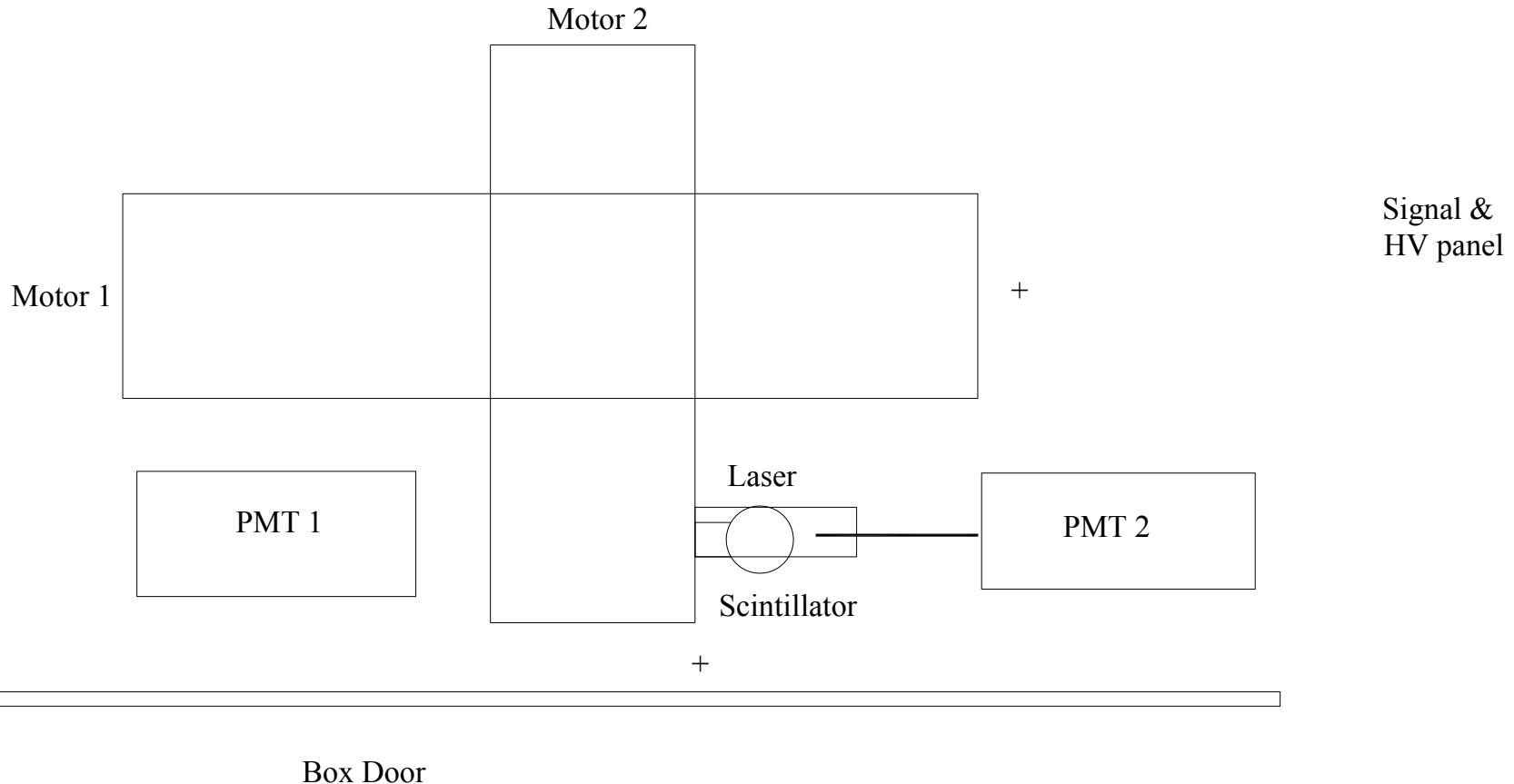
John Kroon

Winston Hensley

Outline

- Setup
- PMT Stability
- Unglued Tests:
 - Reproducibility
 - Positioning error test
- Glued Tests
 - Glue Reproducibility
- Comparison
- Results

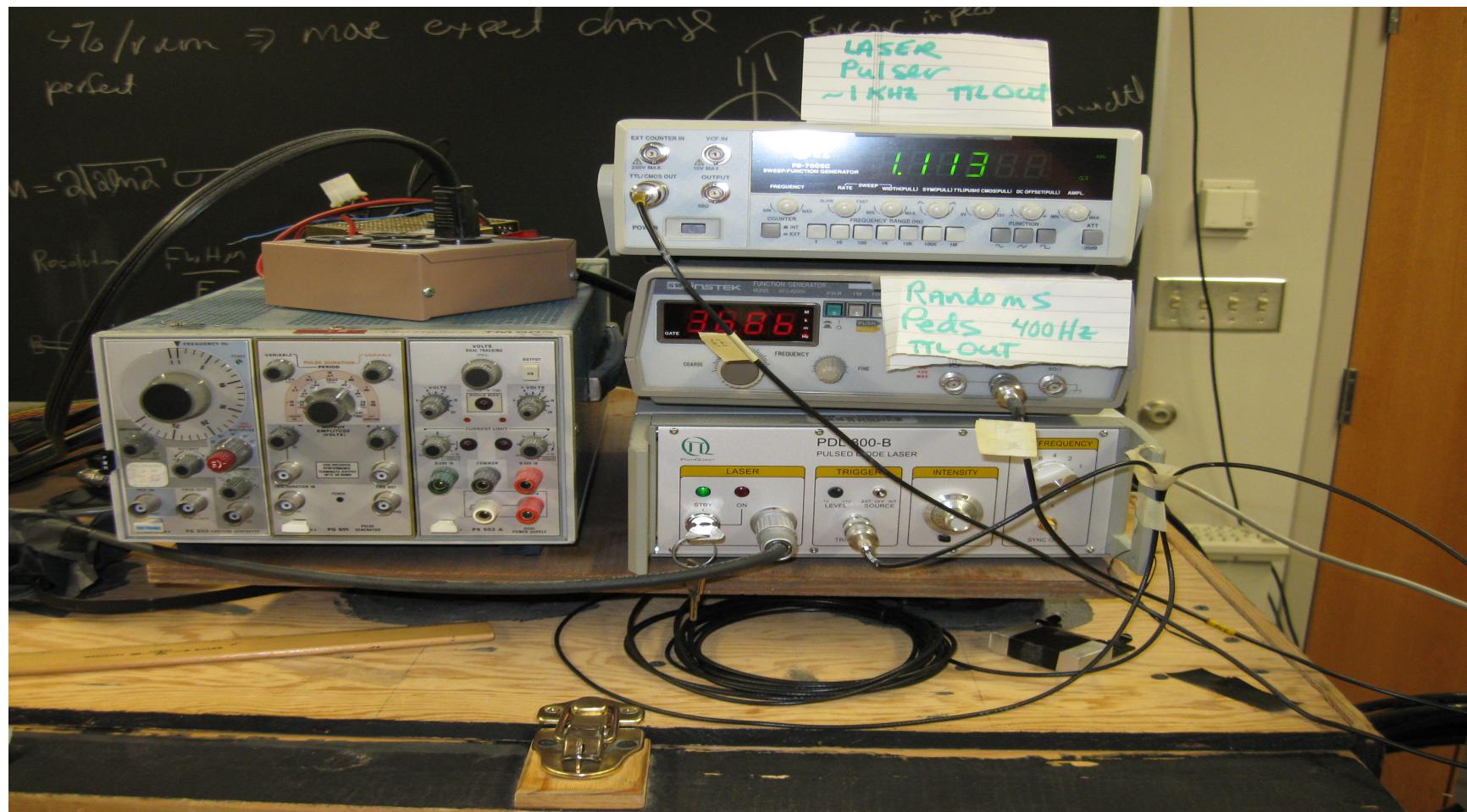
Glue Test Setup



HV → Fixed and Constant



Laser/Peds Pulsar



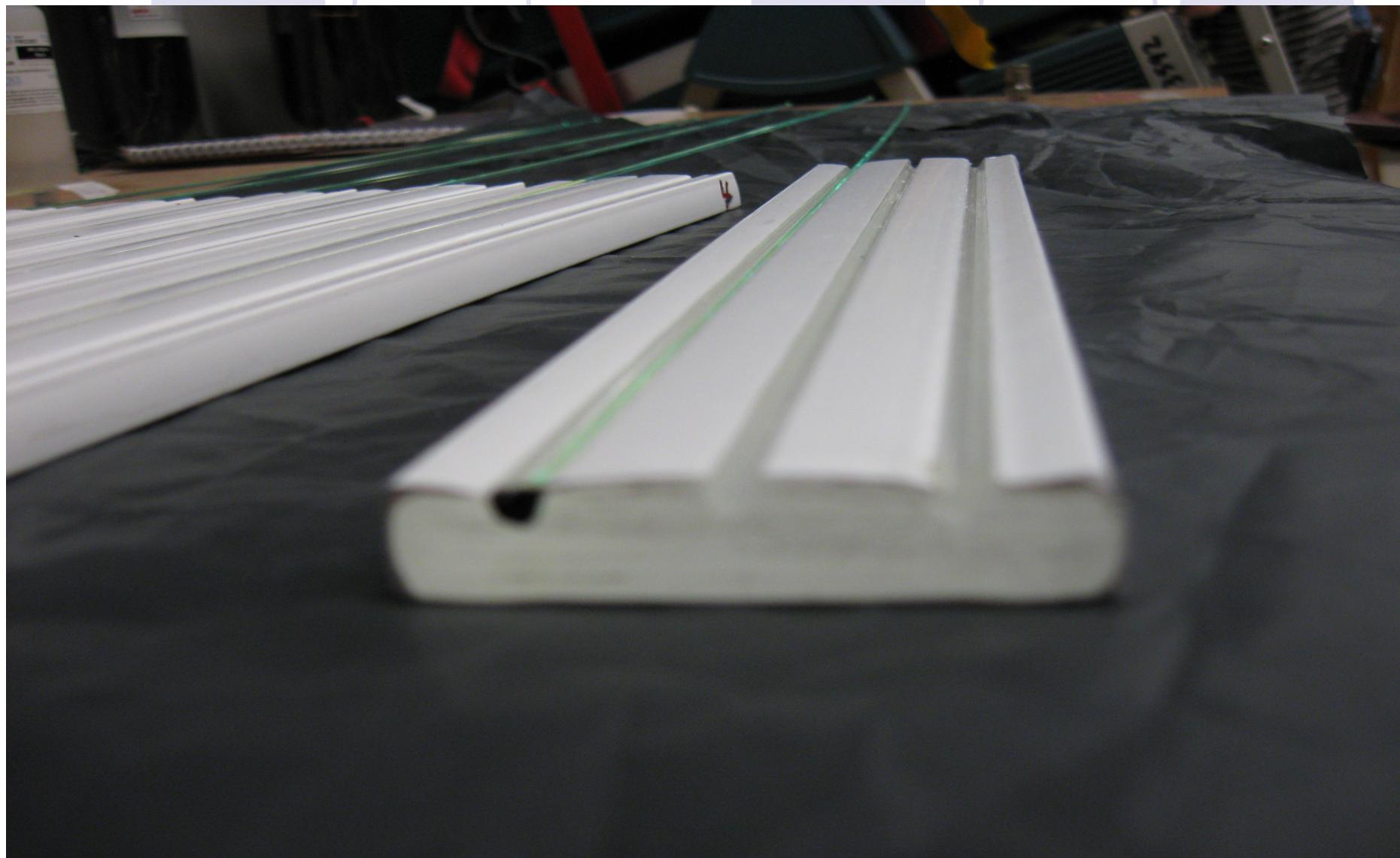
Observations

Tests

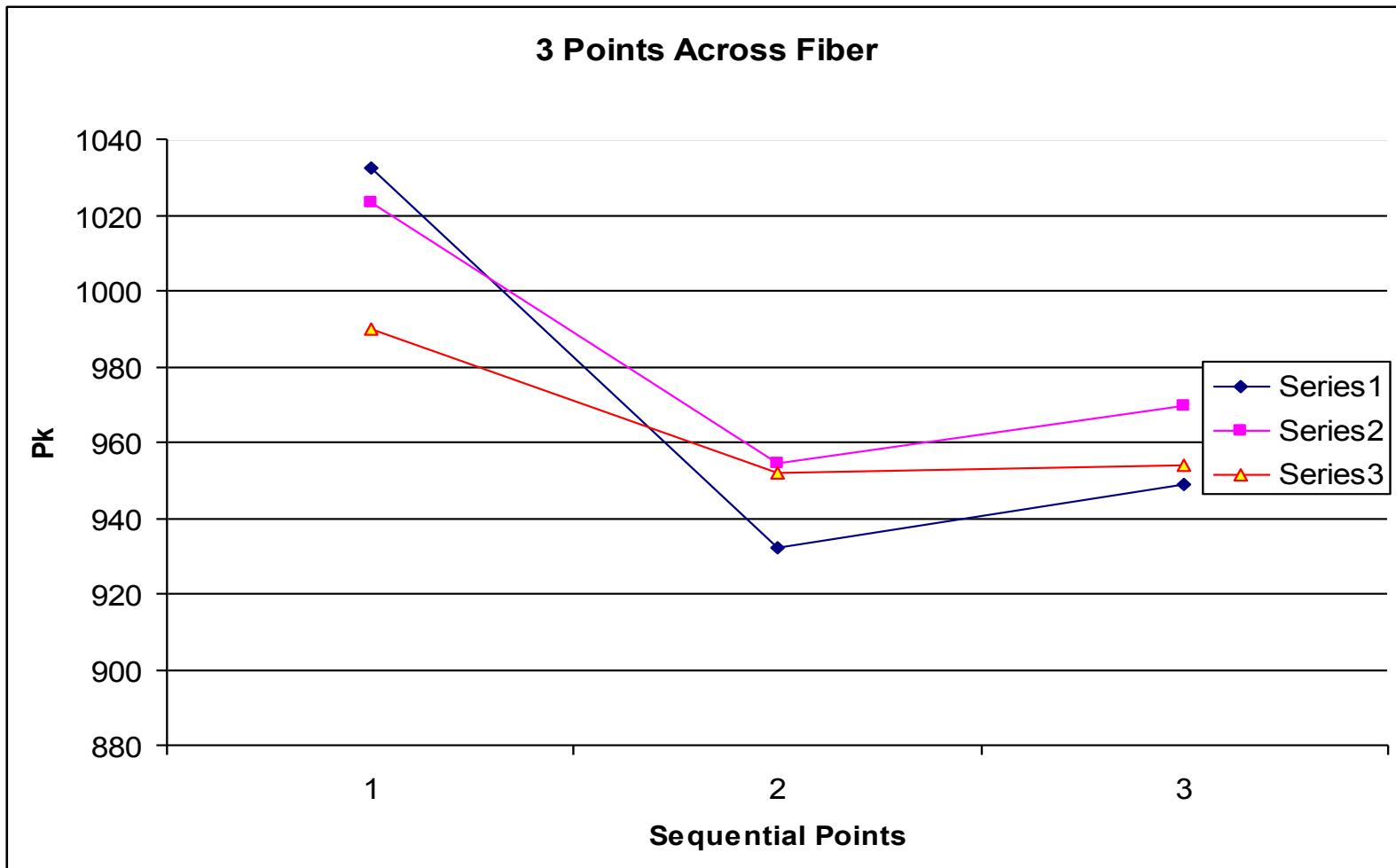
- Stability 1.5% (Am-241 radioactive pulser for gain monitoring)
- Reproducibility (block0 block0 comparison)
- Positioning (finding the groove)
- Stable repositioning after removal
- Glue ratio error (blackened end)*

Precision Measuring

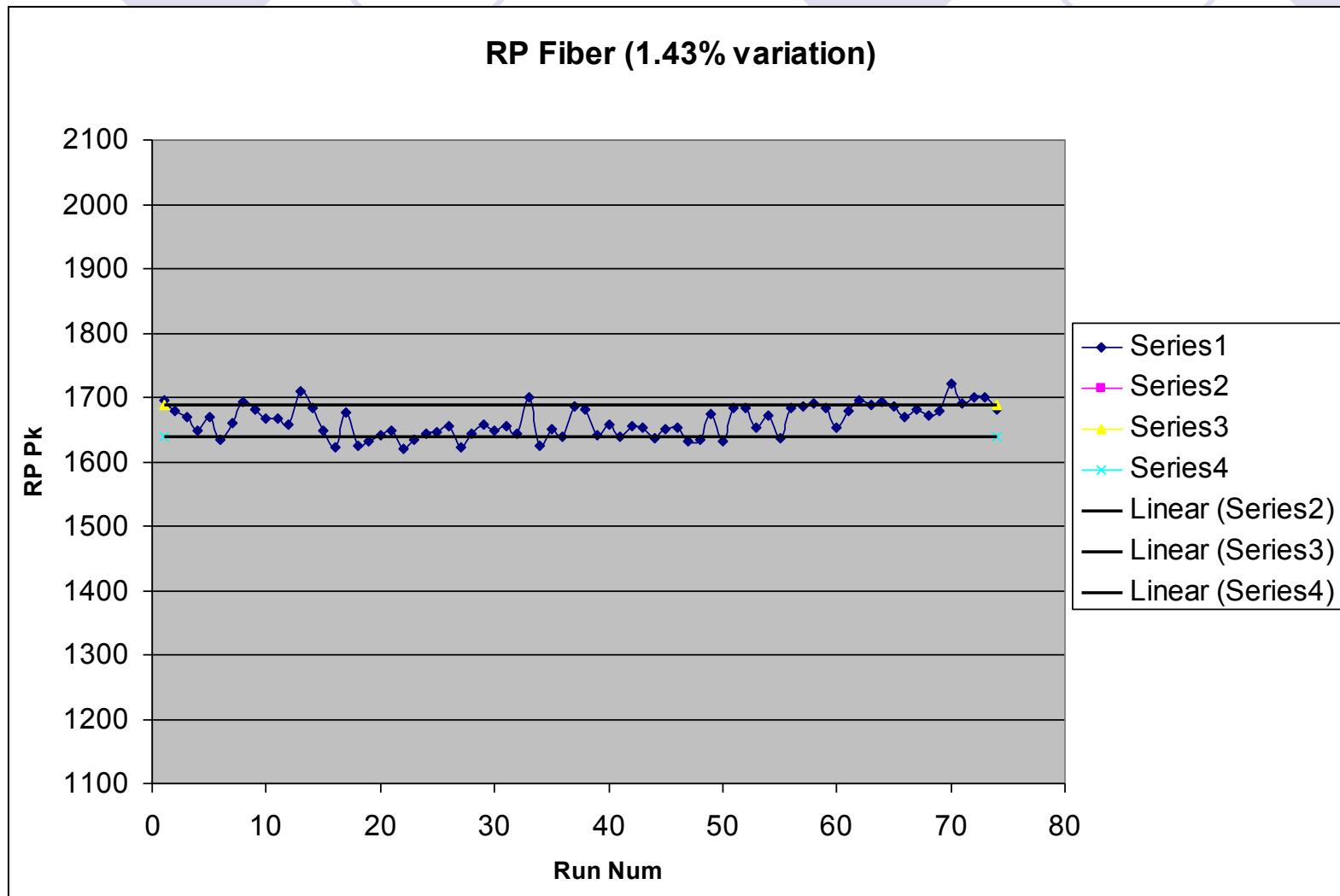
- For each scintillator block (9 test points), peaks typically **5%** variation
- For three central optimal points, variation typically **3%**
- Fiber readout stability...few percent



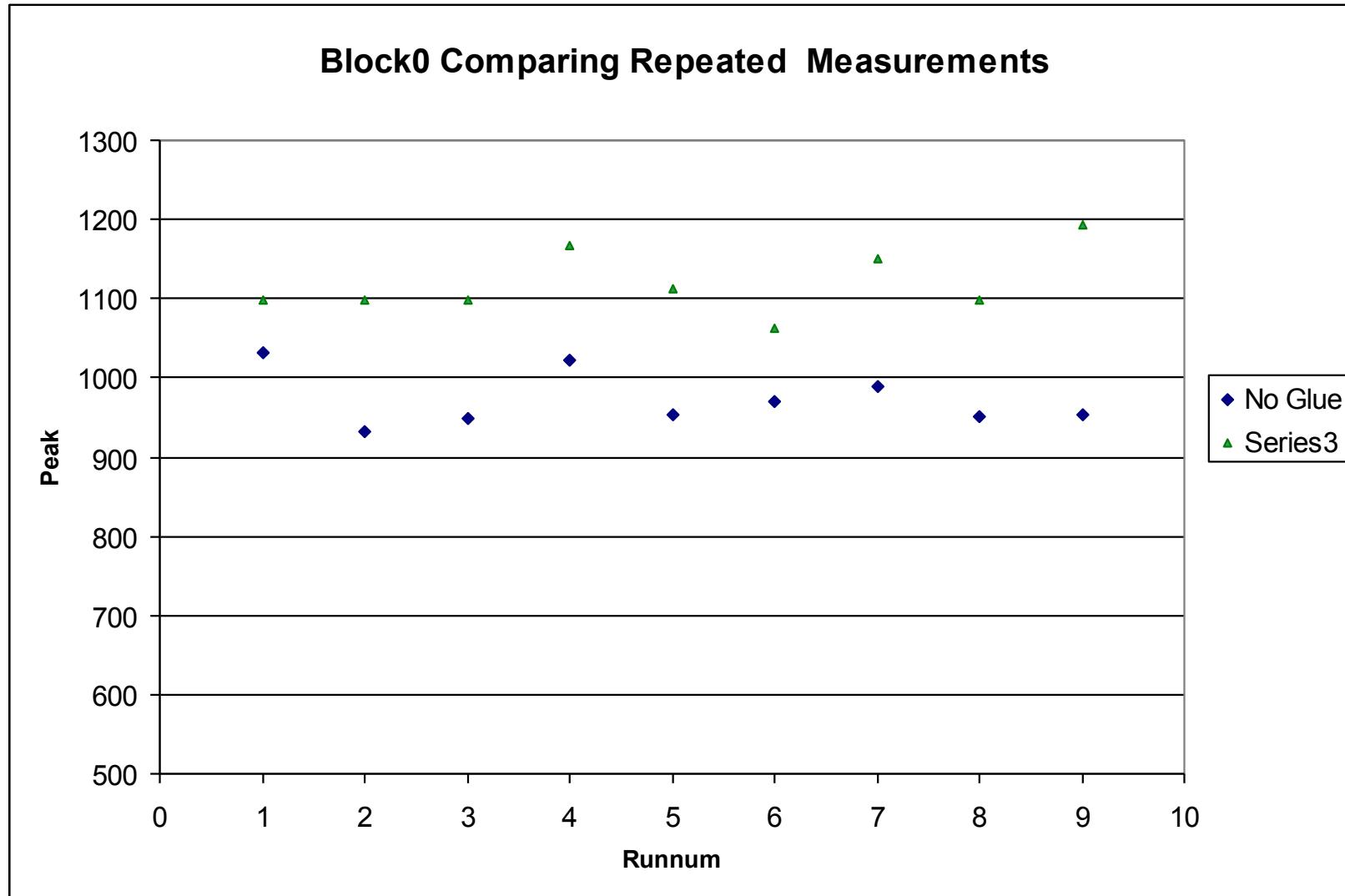
Optimal Location: Middle of Groove



PMT Stability → Am-241 RP

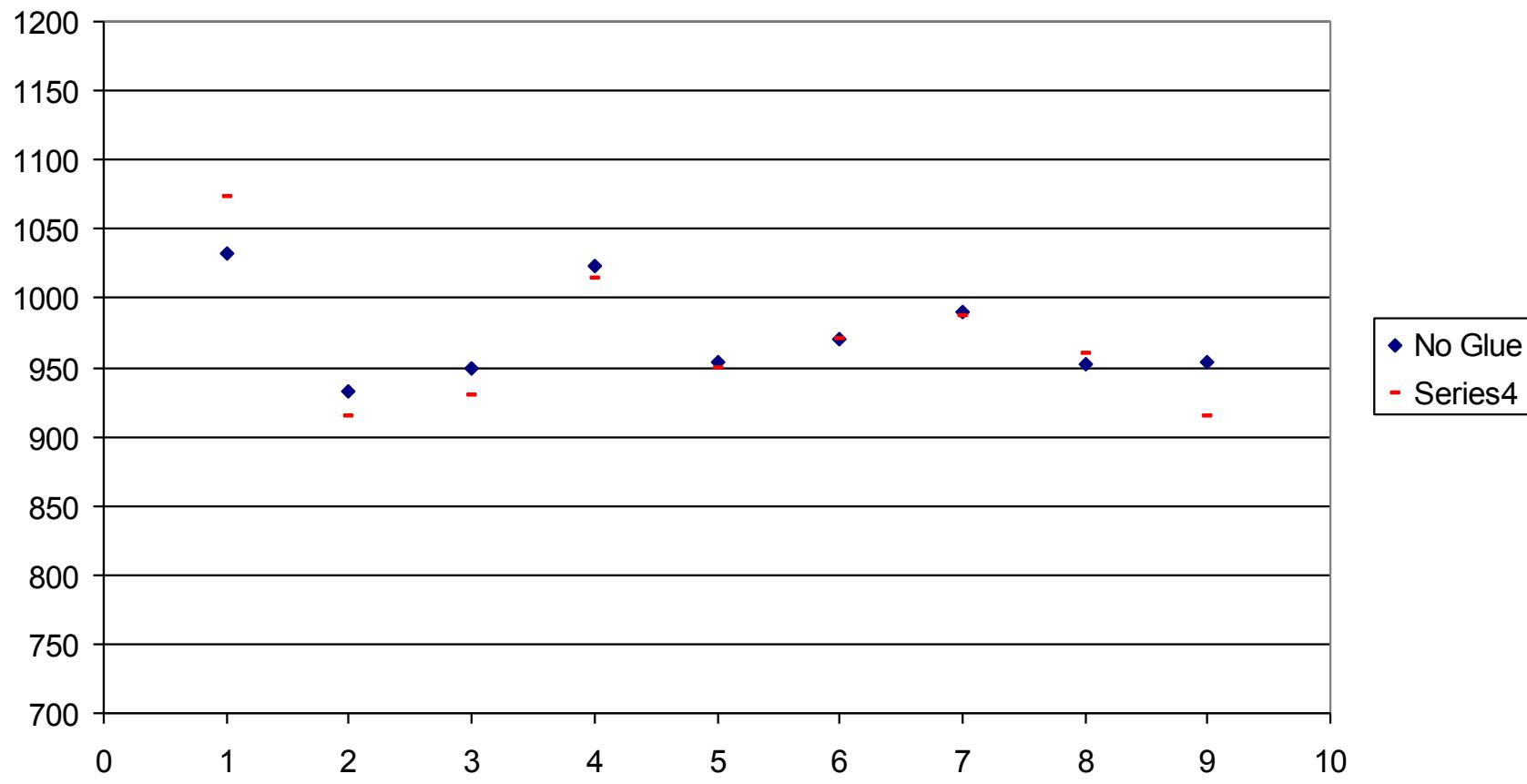


~10% Difference, Scale Using Mon. PMT



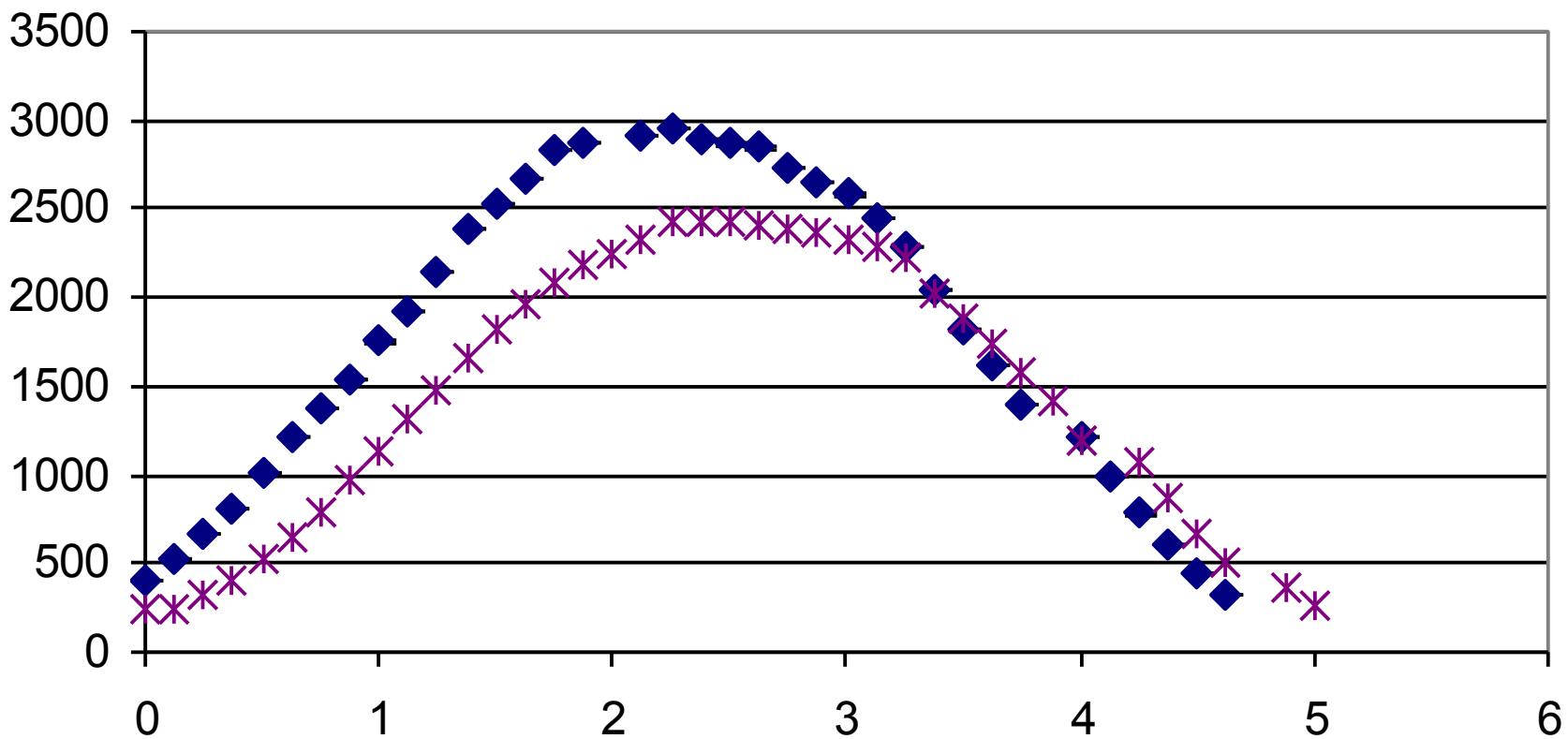
Scaled Data (from previous chart)

Block0 Data Comparing Repeated Measurements of Same Block But Second Result Scaled by the Ratio of Monitor



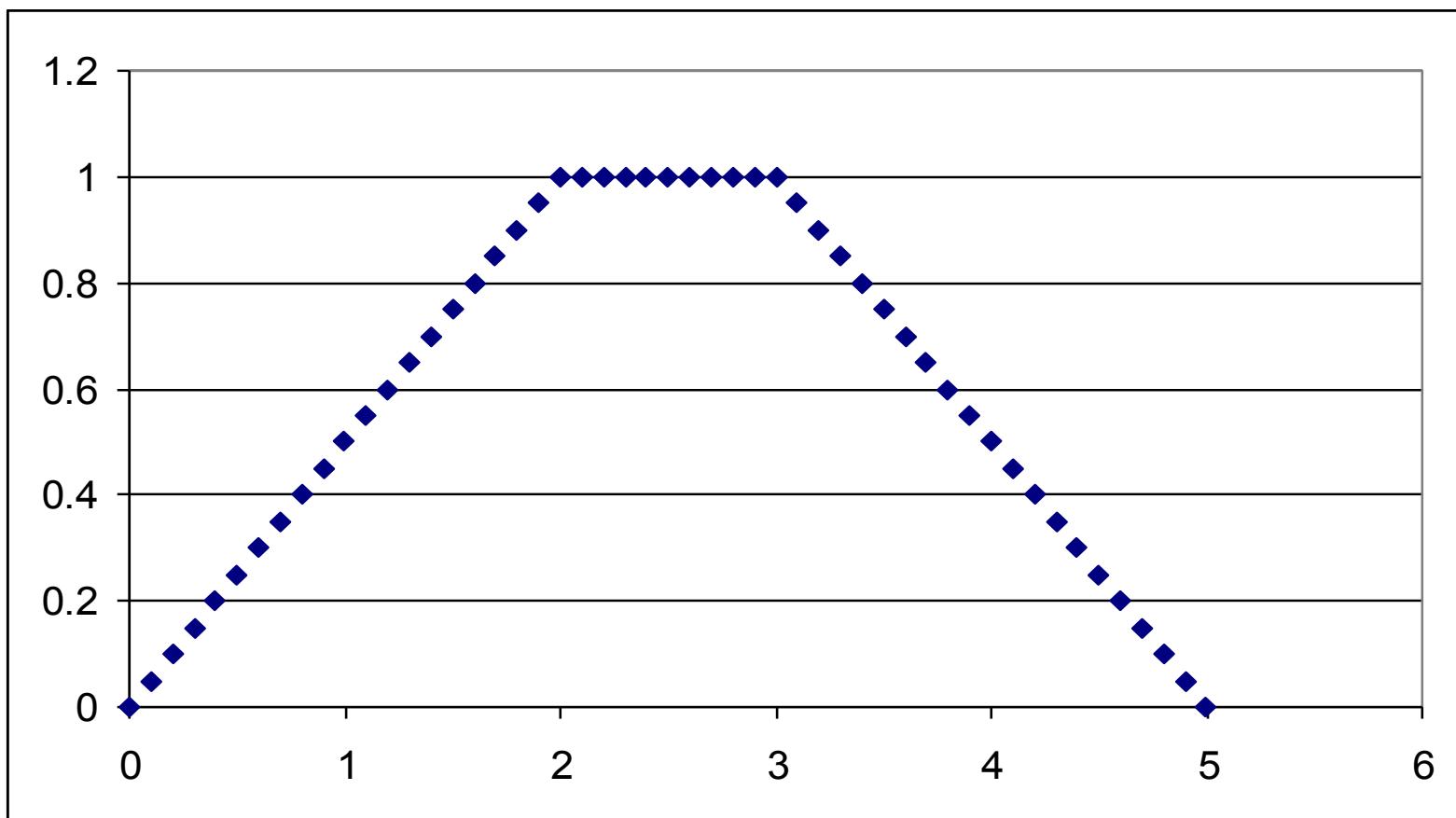
Positioning Tests

Two profiles

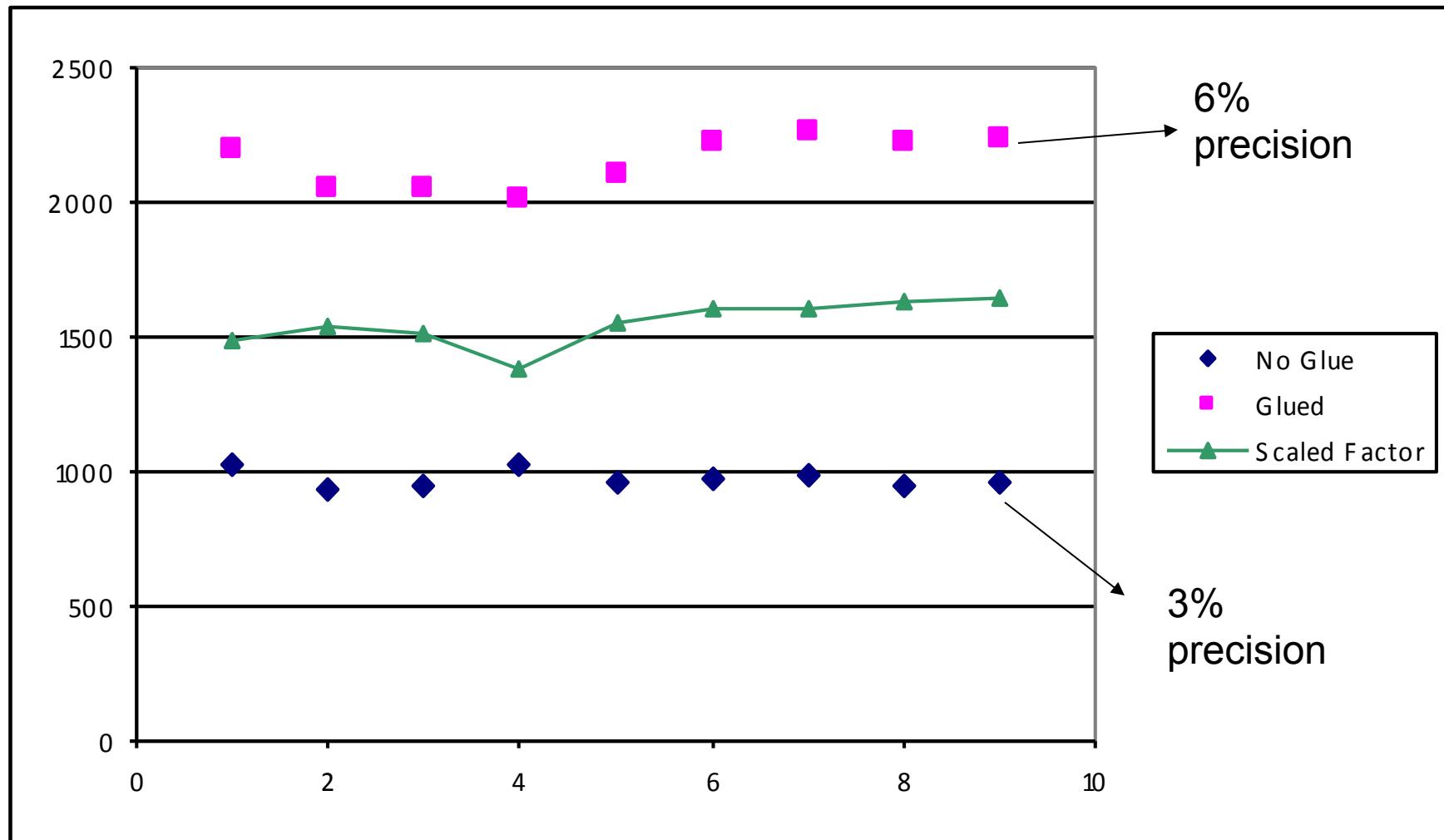


Model of Fiber Profile

- Laser Motor Precision ~0.1 mm

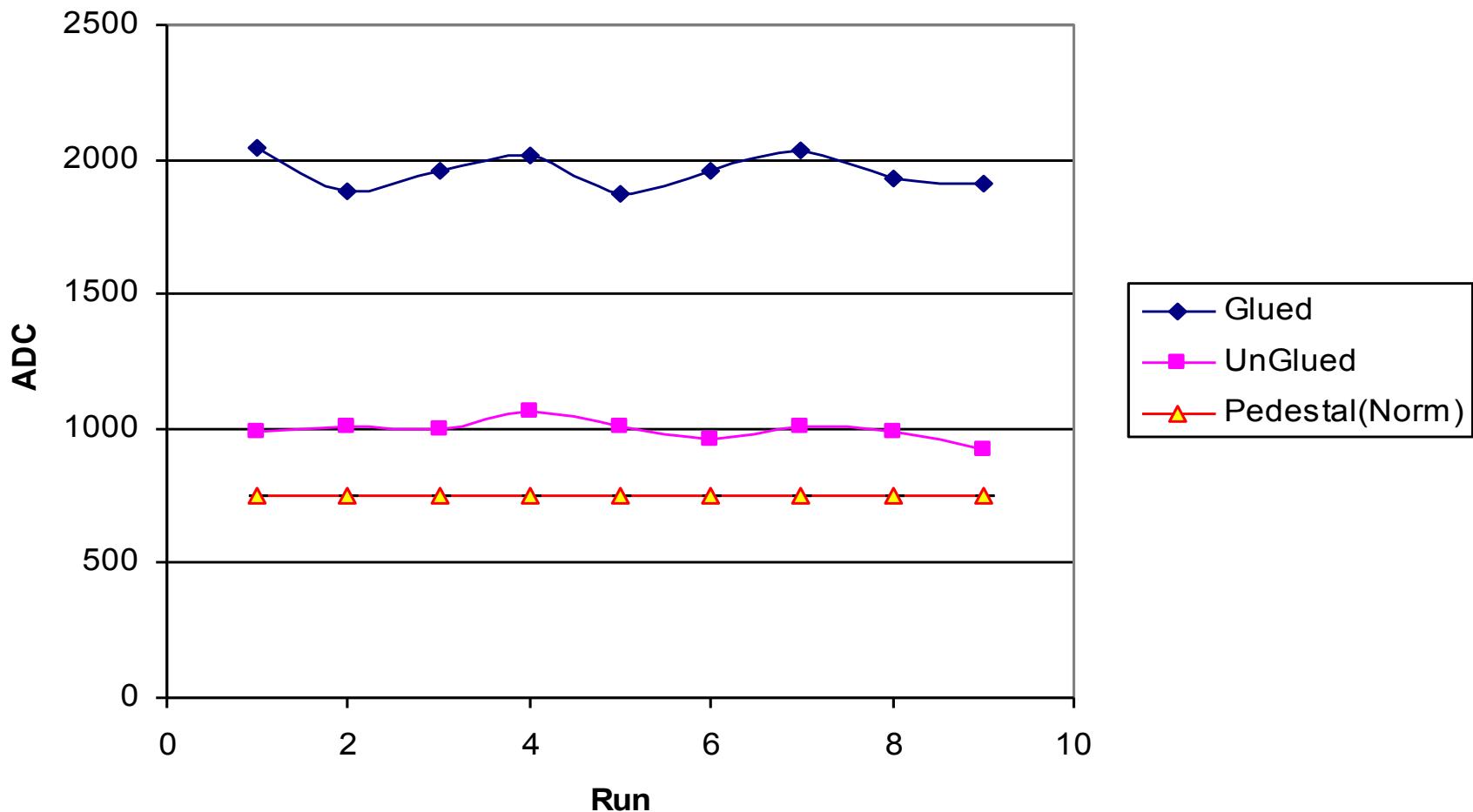


(Block0) Glue/No glue Comparison

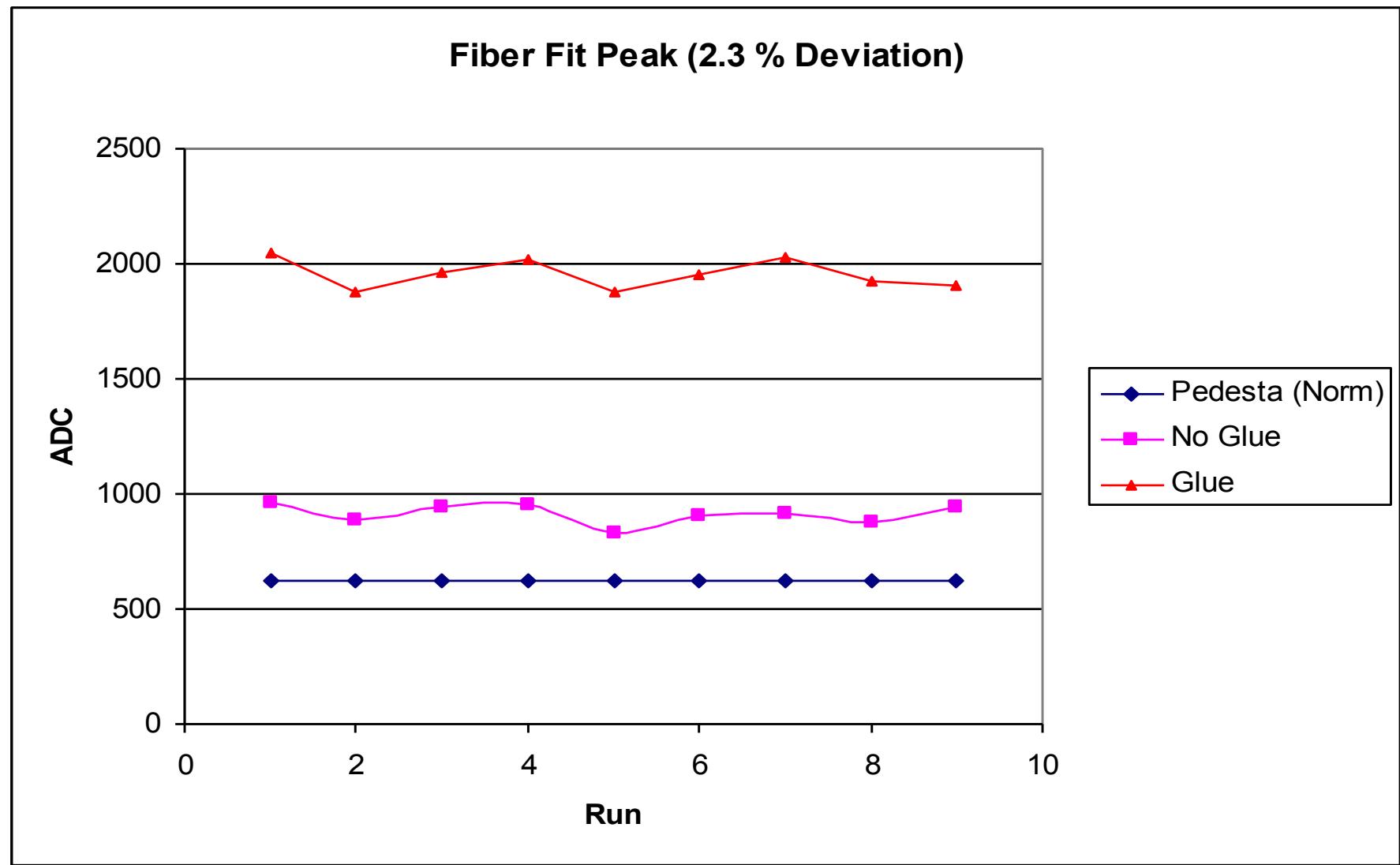


(Block1) Glue No Glue Comparison

Fiber Fit Peak (3.9% Deviation)

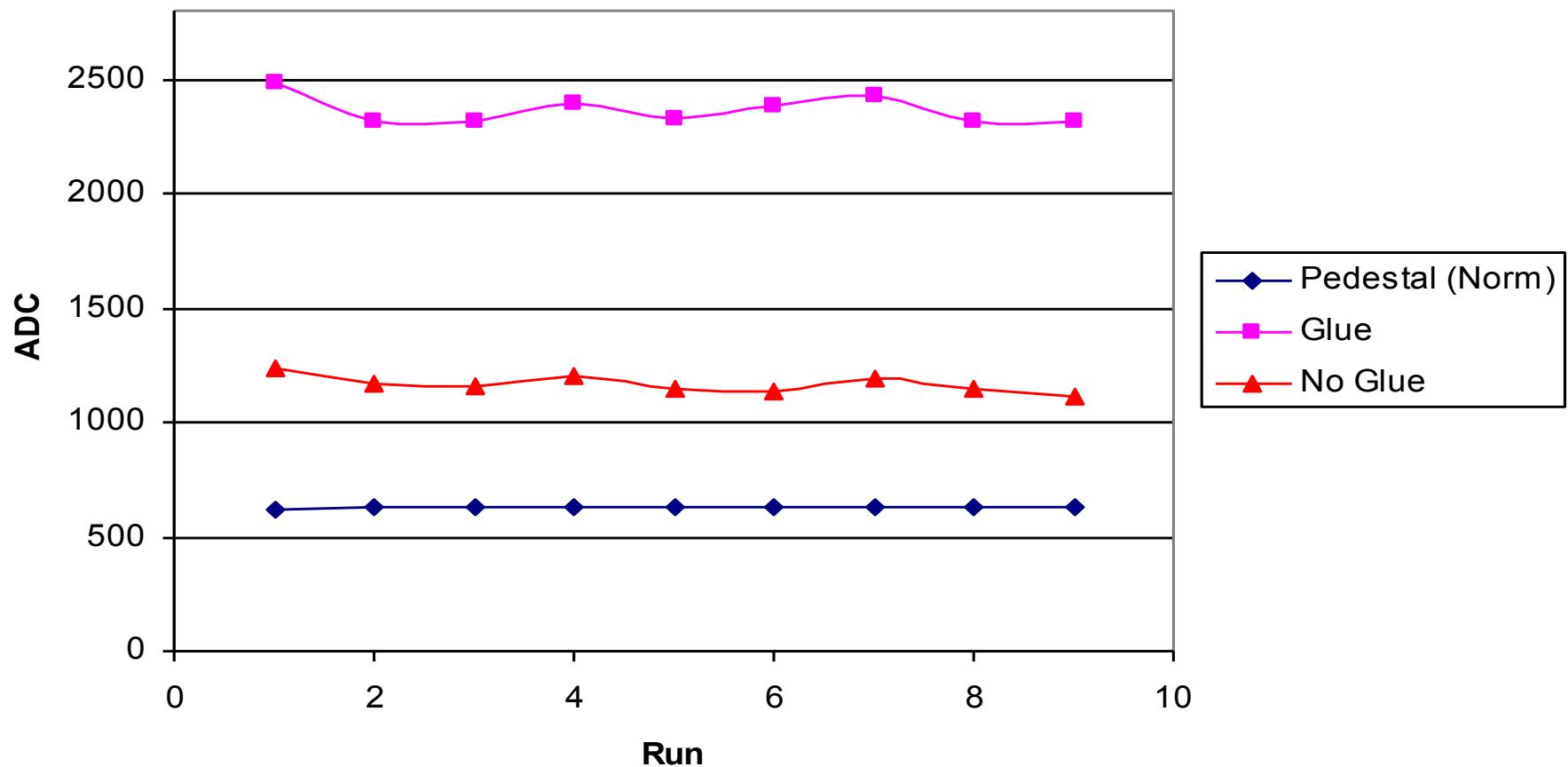


(Block2) Glue No Glue Comparison



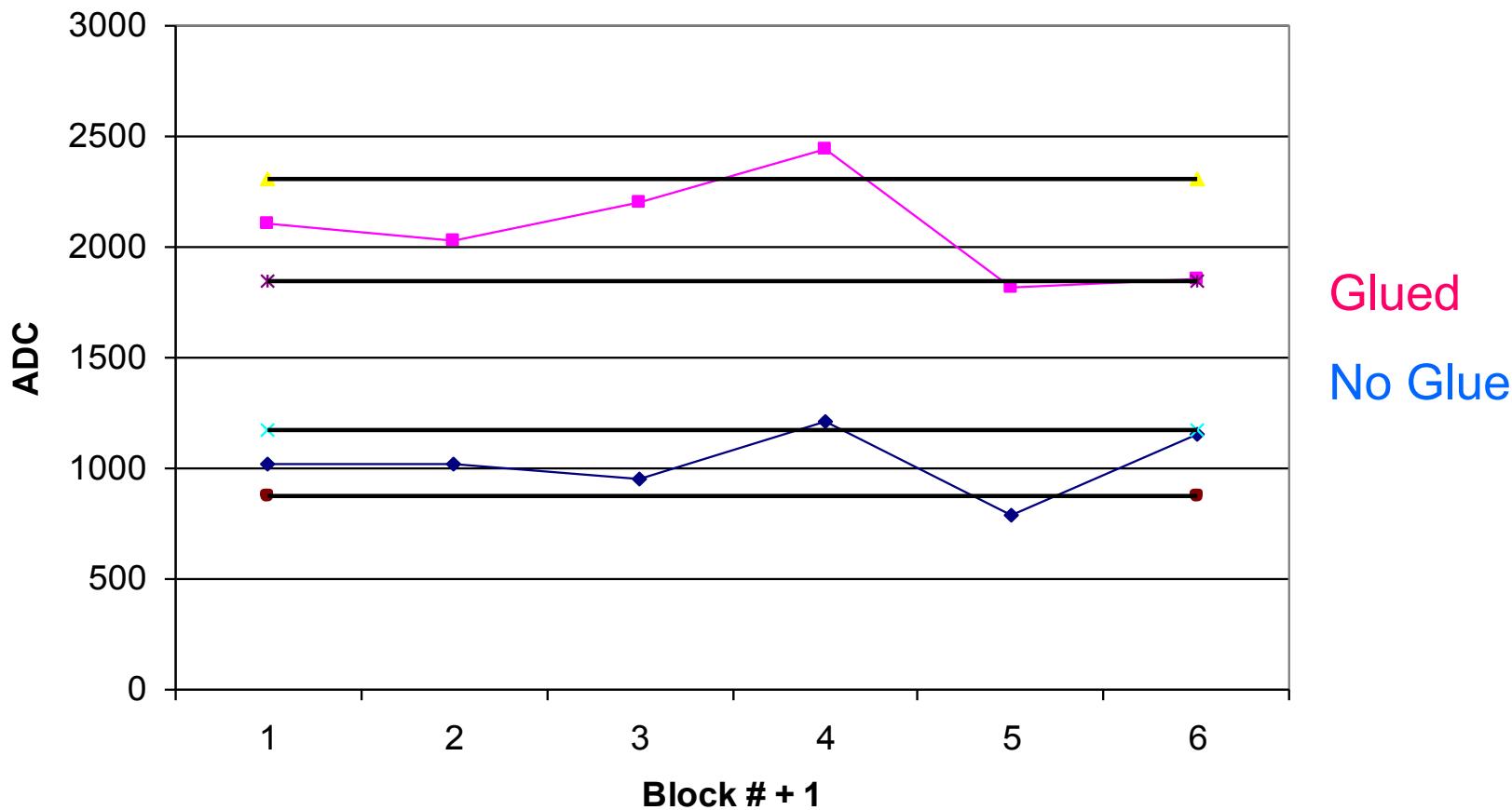
(Block3) Glue No Glue Comparison

Fiber Fit Peak (1.9% Deviation)



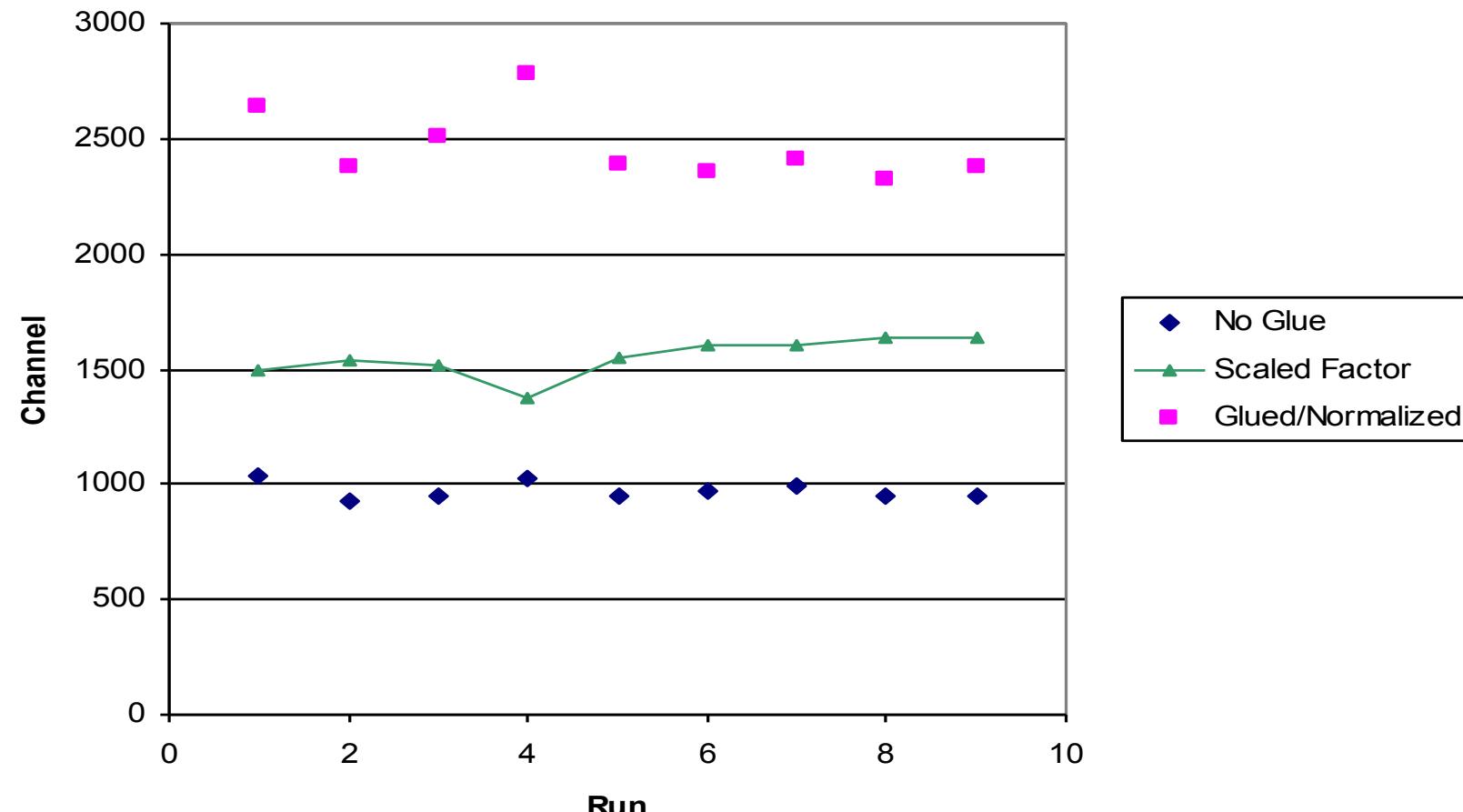
Overall Glue Comparison

Mean of Center Groove Fiber Pk



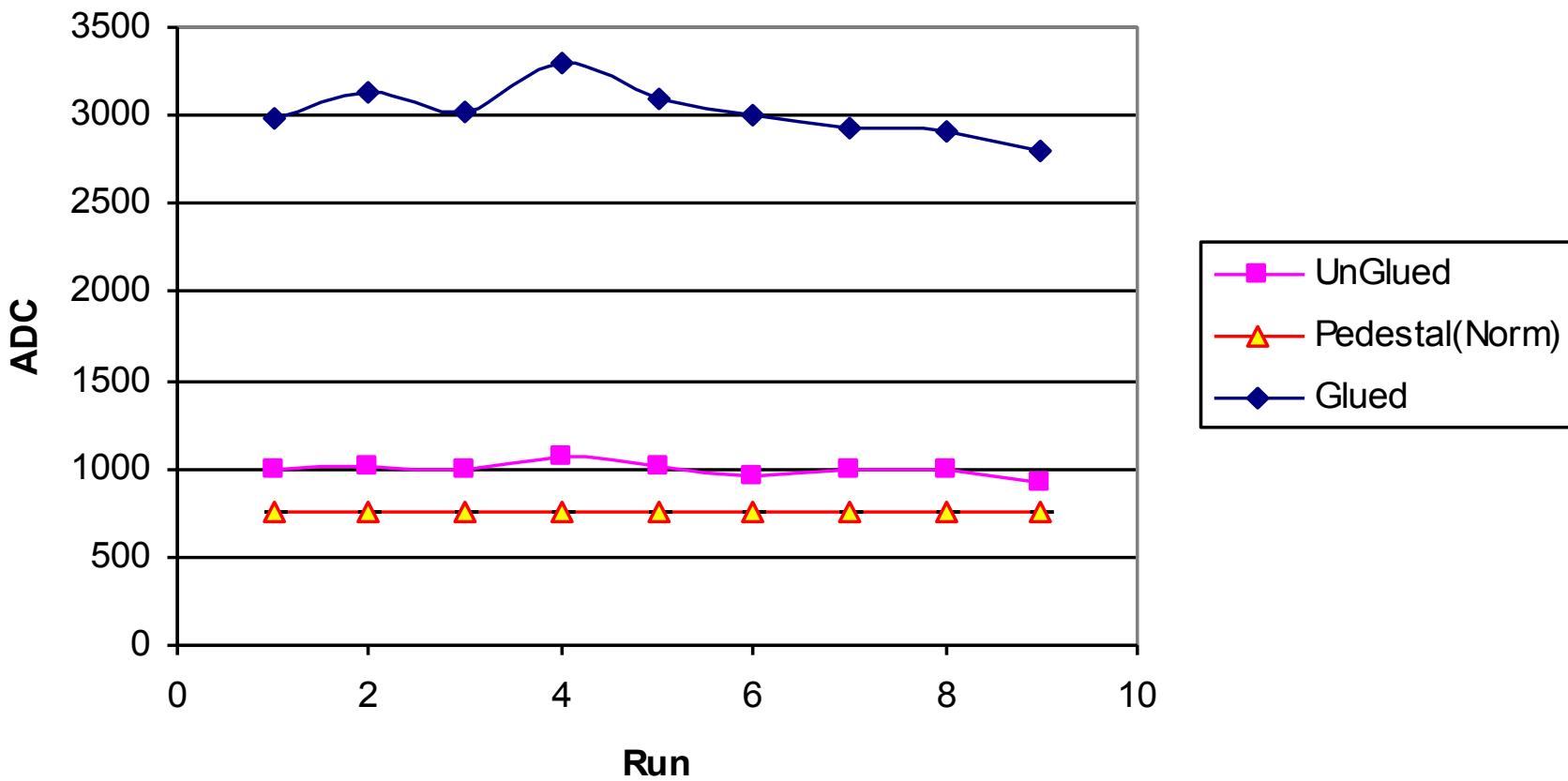
Block0 Normalized

Fiber Chosen Peak (Normalized)



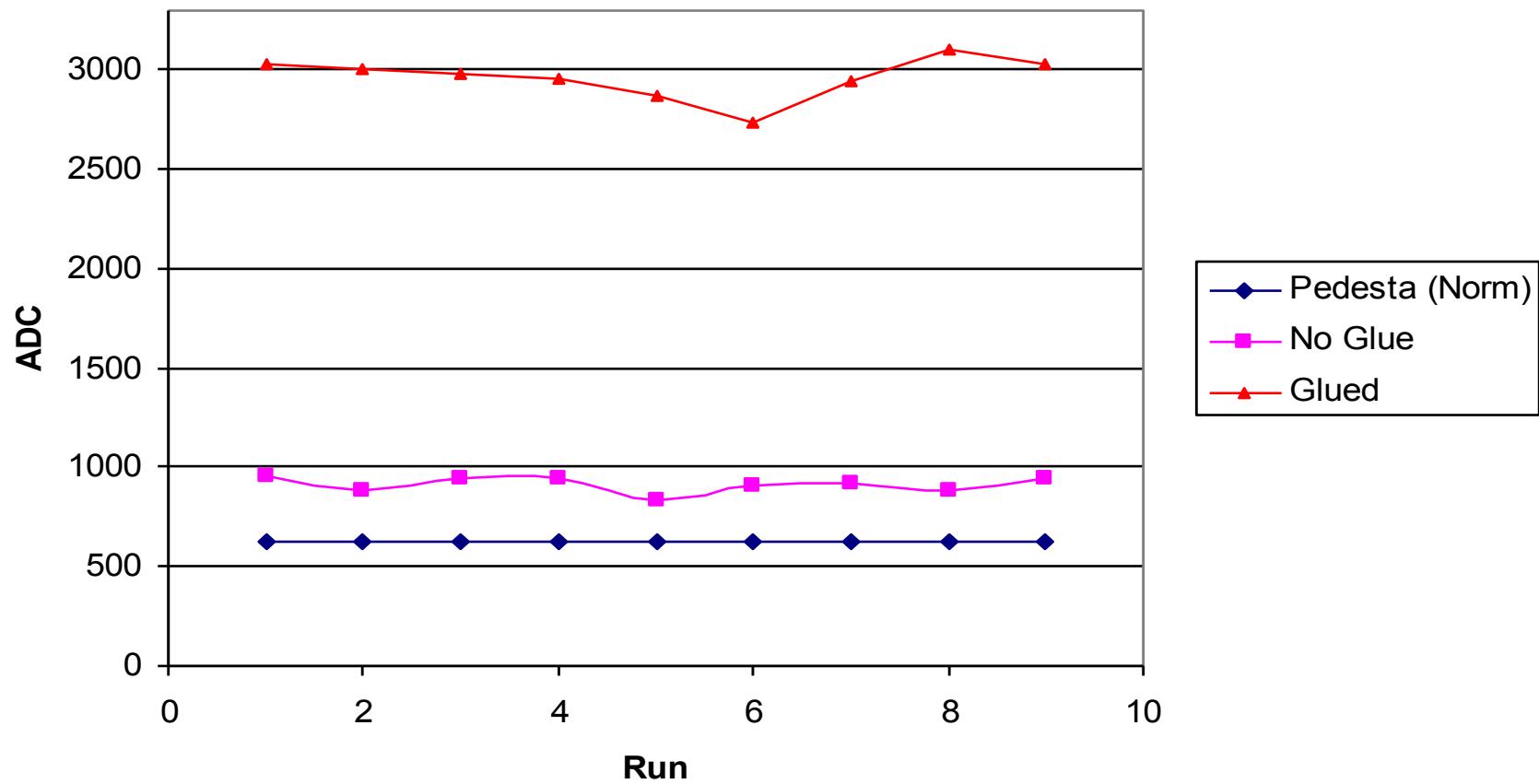
Block1 Normalized

Fiber Fit Peak (Normalized)



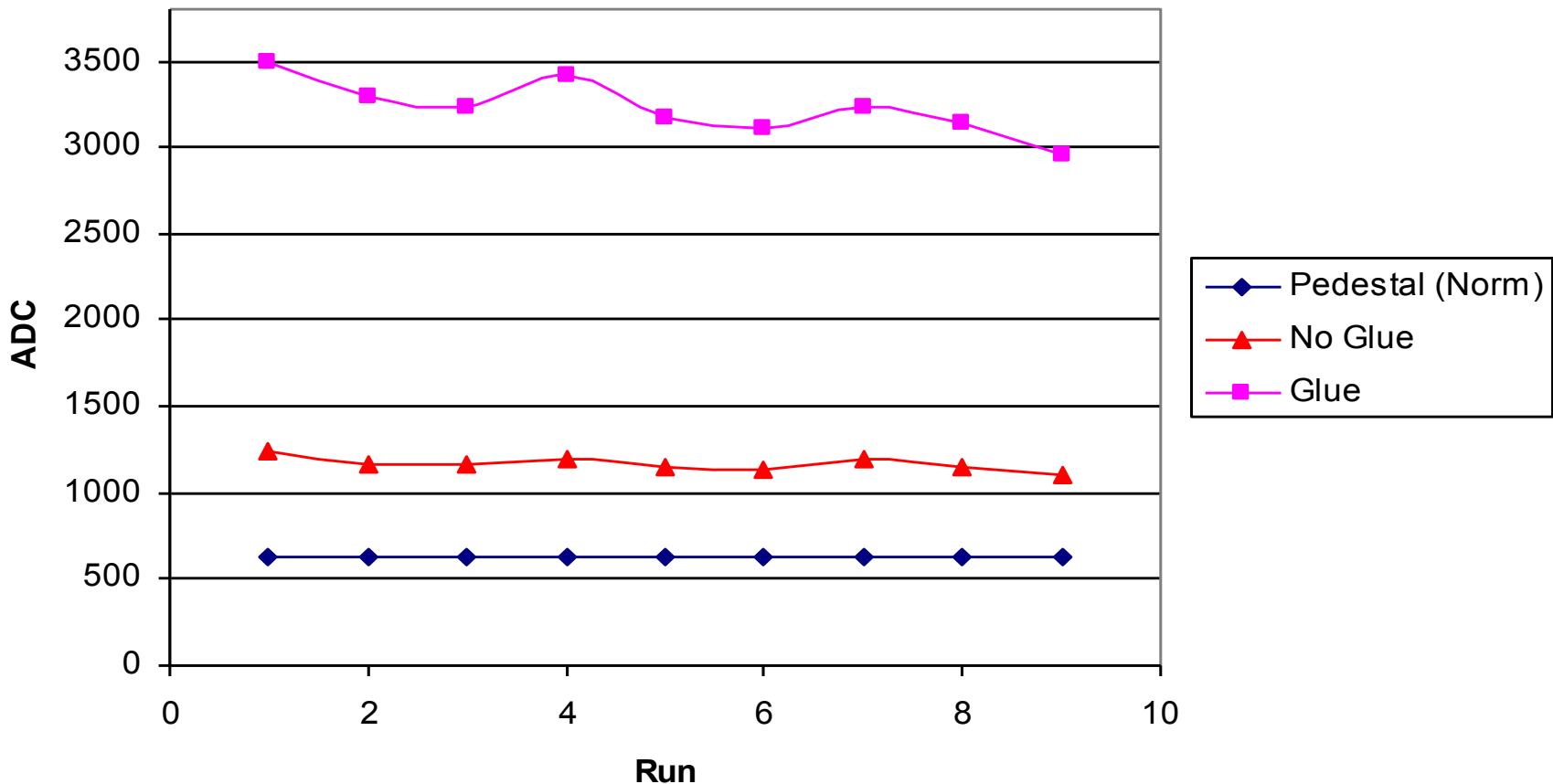
Block2 Normalized

Fiber Fit Peak (Normalized)



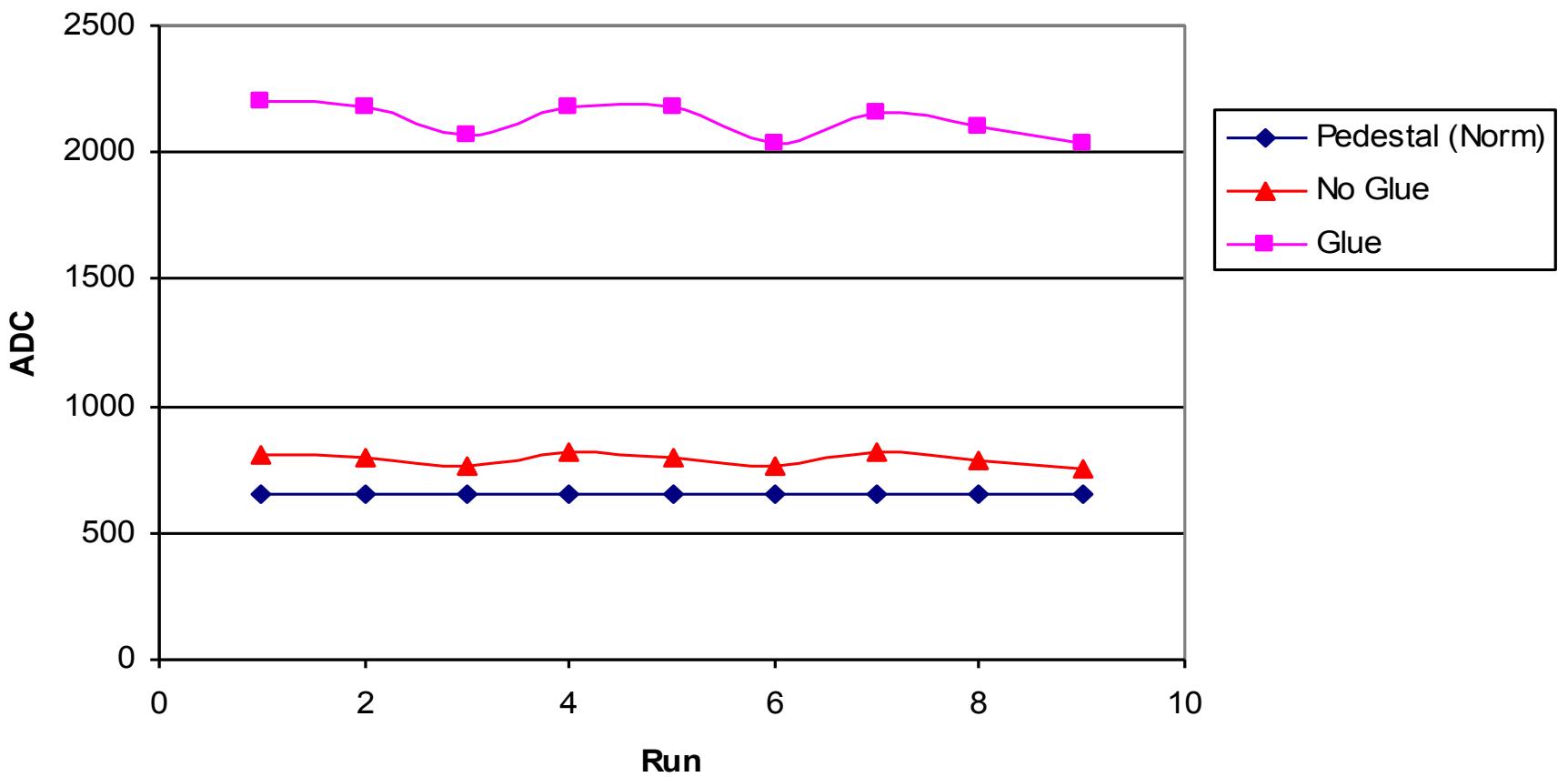
Block3 Normalized

Fiber Fit Peak (Normalized)

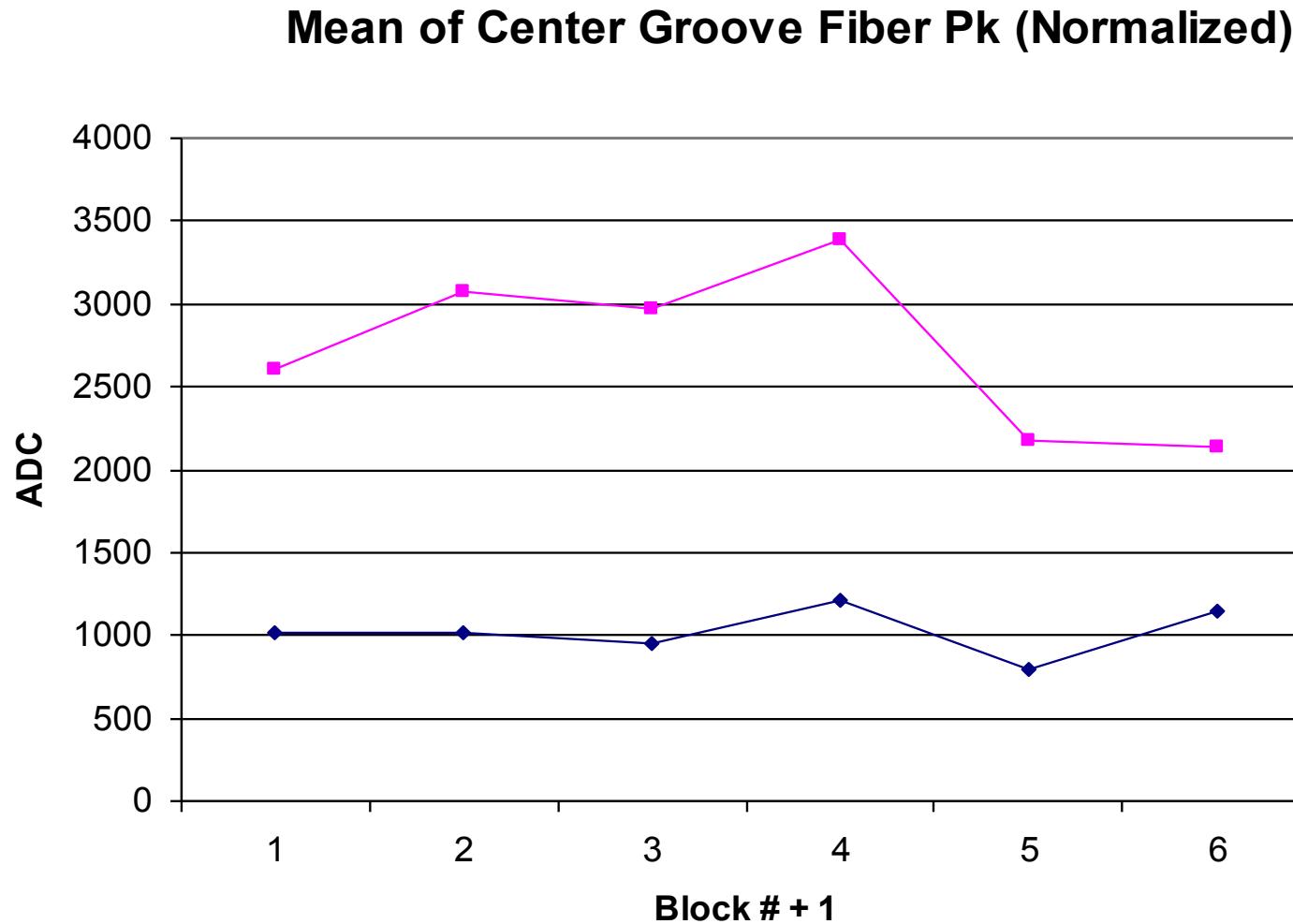


Block4 Normalized

Fiber Fit Peak (Normalized)



All Block Tests, Relative Performance

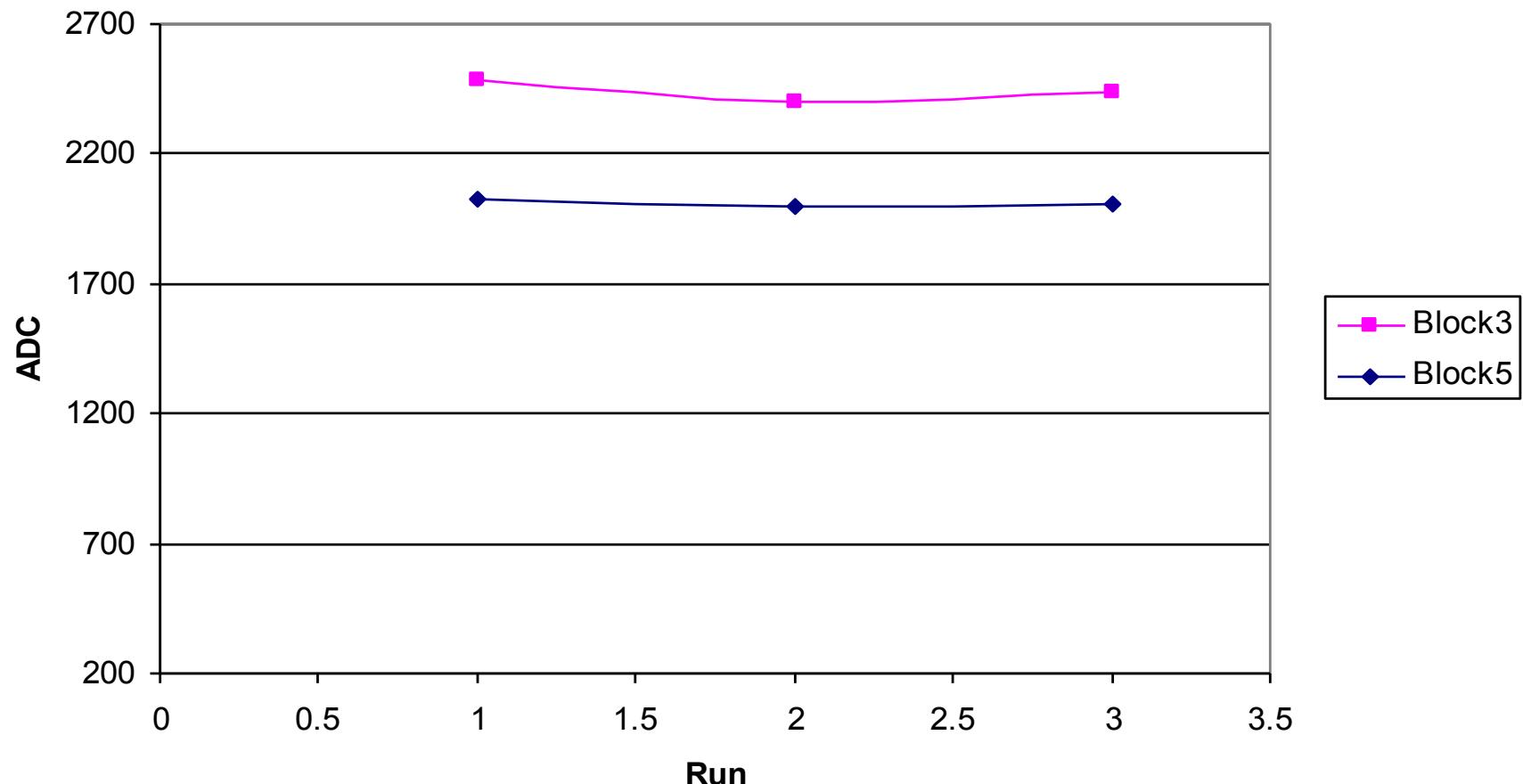


Gluing METHOD Reproducibility Test

- Take Block3 → Epon Resin
- Reglue Epon into a different Block (block5)
- Retest this block
- Compare with block3

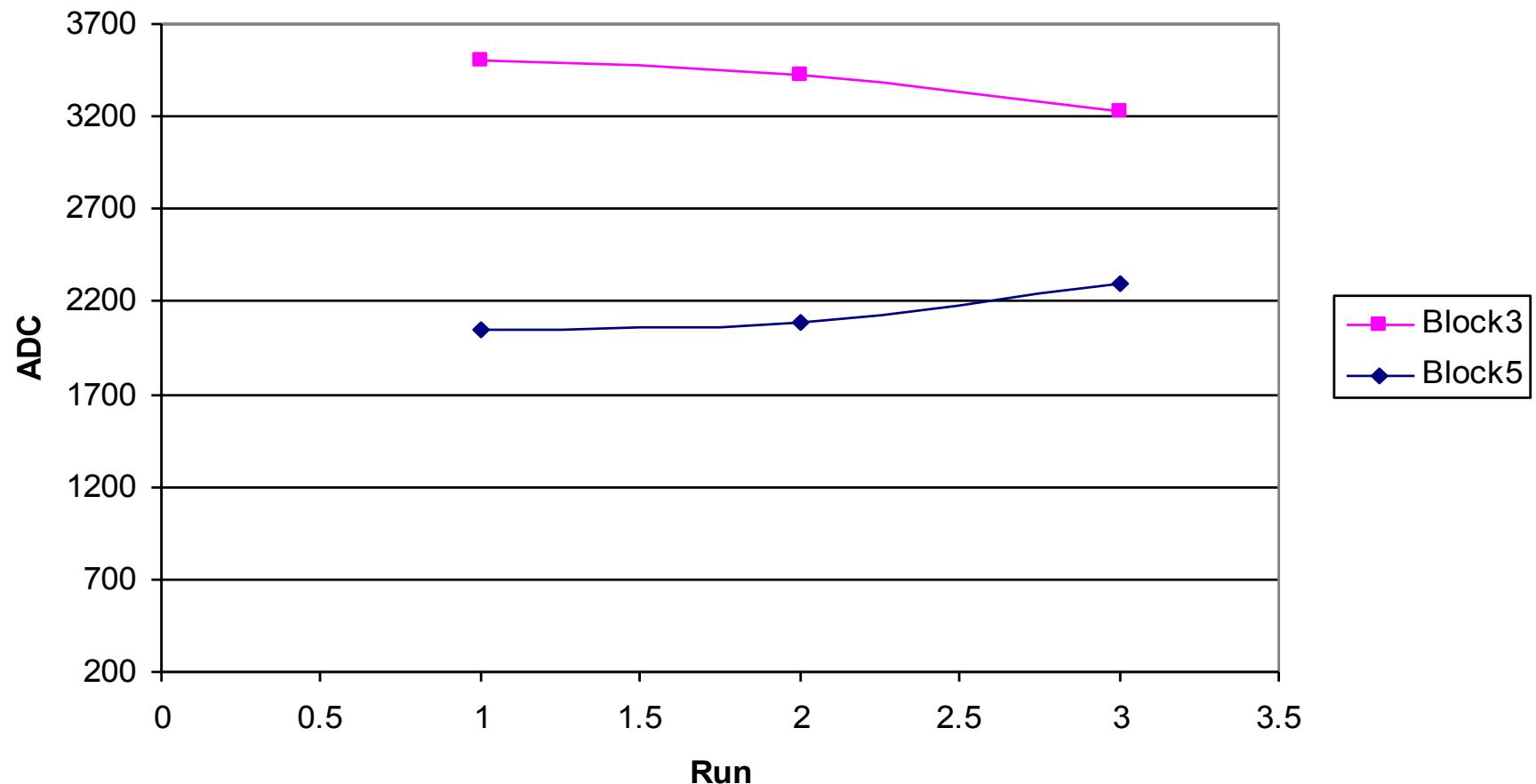
Center Groove Used for Comparison Before NORMALIZATION

Epon Resin 10% Variance, Between Block Trials



Gluing Method Result NORMALIZED

Epon Resin 34% Variance, Between Block Trials



Glue Tests Overview

- Overall agreement of 9% (between blocks) with a 5% agreement within the 9 test points for each scintillator block
- Monitor used to scale data
- Choose three center groove data points and agreement then is 3%
- Reproducing a glue test 34% error → anomalous
- However, reproducibility within an already glued block → stable to 5%

Summary of Glue Results (Before Normalization)

- Epo-Tek 301-2FL
 - 2.2 glue ratio yield
- Epo-Tek 301
 - 2.2 ratio
- BC600
 - 1.9 ratio
- EJ500
 - 2.2 ratio
- Epon Resin 815C (Minos)
 - 2.0 ratio
 - 1.5 ratio

Summary of Glue Results (Normalized)

- Epo-Tek 301-2FL
 - 2.5 glue ratio yield (**4% deviation**)
- Epo-Tek 301
 - 2.7 ratio (**1.3% deviation**)
- BC600
 - 3.0 ratio (**2.3% deviation**)
- EJ500
 - 3.2 ratio (**5.3% deviation**)
- Epon Resin 815C (Minos)
 - Trial 1: 2.7 ratio (**2.3% deviation**), Trial 2: 1.92 ratio