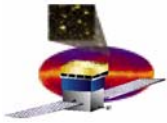
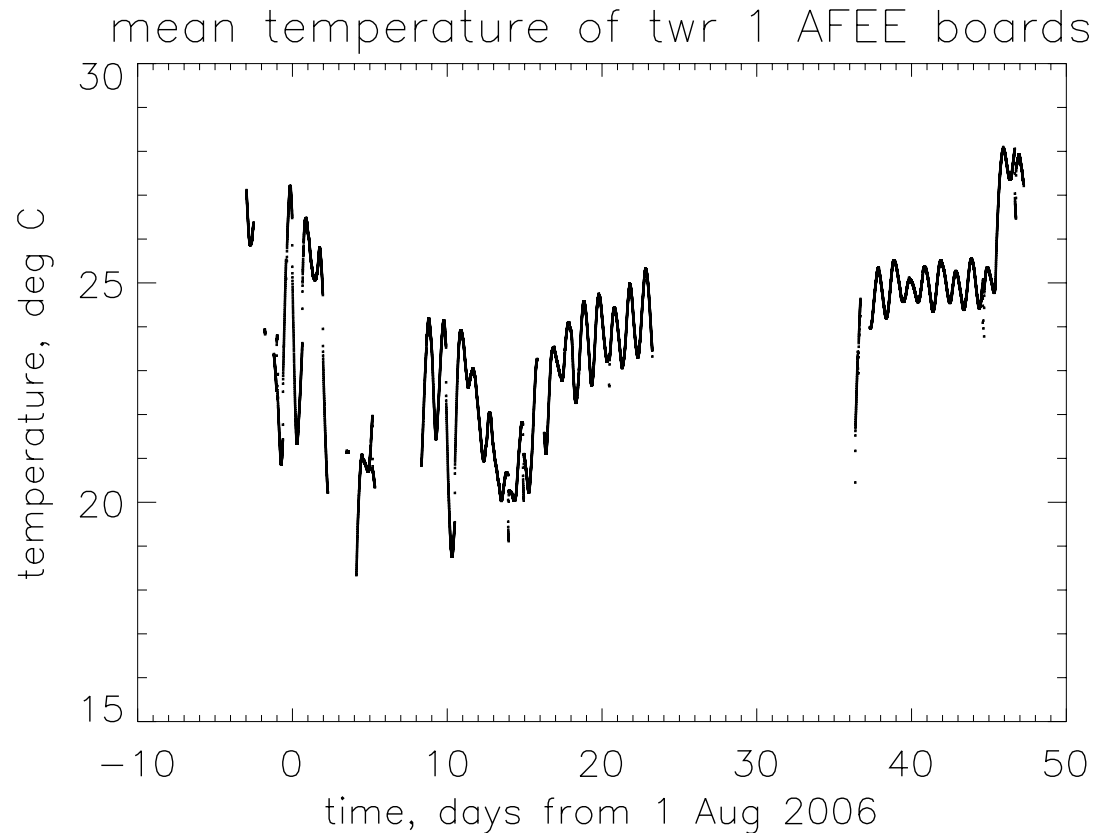


Correction of temperature drift of CAL pedestals in Beam Test data.

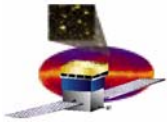
Alexandre Chekhtman
NRL/GMU



Temperature variation during beam test period



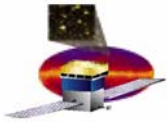
- CAL electronics temperature varied between 18C and 28C
- Pedestal run 953, used as a source of pedestals for BT data processing was collected on Aug 4 at the lowest temperature 18 C
- Day/night difference ~2C on PS and ~1C on SPS
- Temperature correction of pedestals is necessary



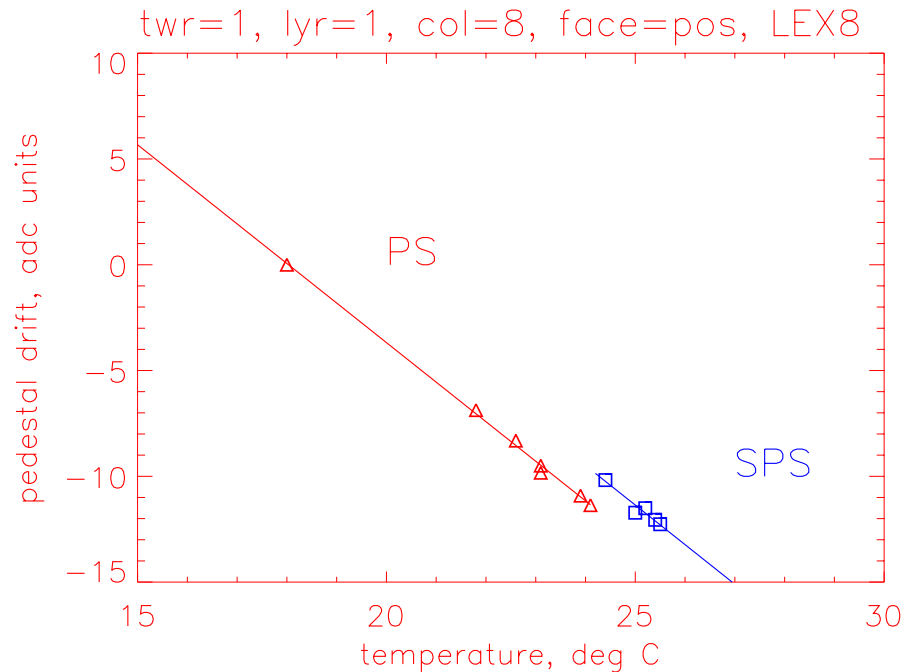
Pedestals runs

- Pedestal runs have BT22 configuration on PS and BT29 configuration on SPS.
- To study temperature pedestal drift in tower 1 I've selected runs with beam in other towers (2 or 3), to avoid possible rate effect.

Run	Date/time GMT	Temperature, C
953	4 Aug 2:39	18.0
1165	8 Aug 14:18	23.1
1191	9 Aug 8:51	21.8
1198	10 Aug 21:15	23.9
1201	11 Aug 8:24	22.6
1569	19 Aug 8:38	24.1
1602	20 Aug 11:40	23.1
1977	8 Sep 23:12	25.0
2026	9 Sep 20:01	25.4
2081	10 Sep 10:29	24.4
2118	10 Sep 21:15	25.5
2181	11 Sep 23:09	25.2

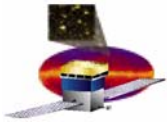


Linear model

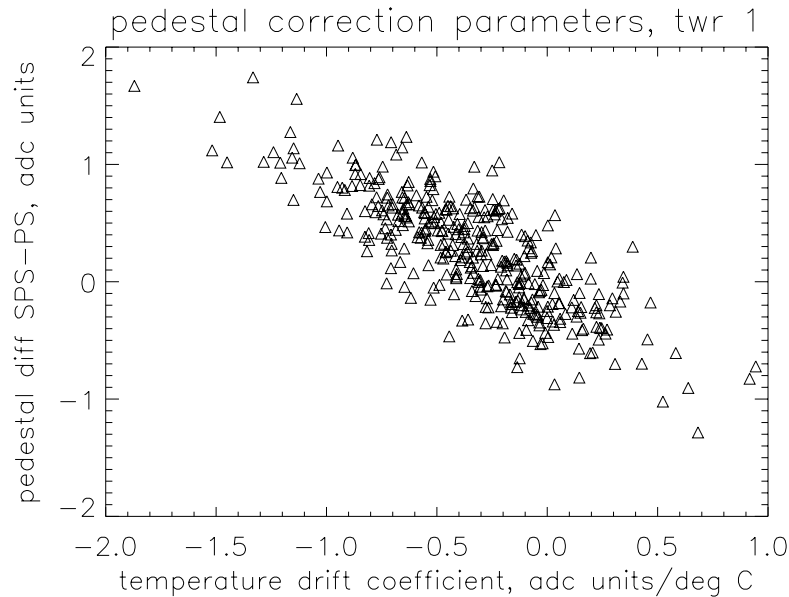


- Output parameters for each channel:
 - Pedestal at 23C
 - Temperature coefficient (slope)
 - SPS-PS pedestal difference

- Plot shows the channel with biggest pedestal drift in tower 1
- Drift is linear with temperature, but there is additional bias between PS and SPS periods
- Temperature variation during PS period is much bigger
 - Temperature slope was defined only for PS period
 - For SPS period the same slope was used and only offset was defined separately.

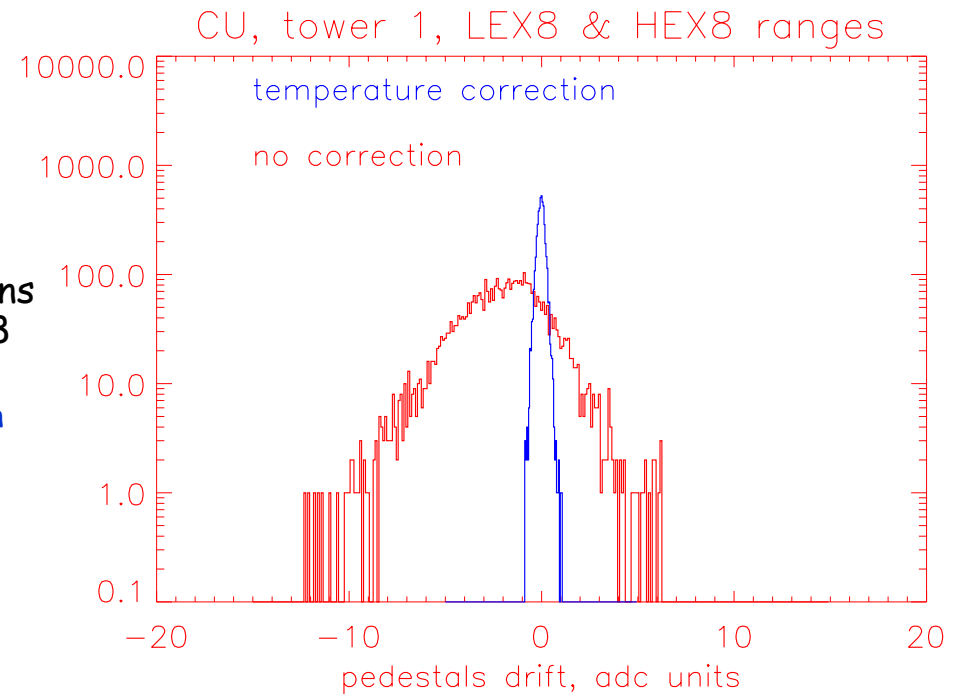


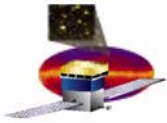
Correction results



- Temperature drift coefficients for tower 1 channels:
 - from -2 to 1 adc unit/deg in LEX8 and HEX8 ranges (see left plot)
 - 10 times smaller in LEX1 and HEX1 ranges
- SPS-PS bias is between -2 and 2 adc units and correlated with slope

- Right bottom plot shows the pedestal deviations for all 12 pedestal runs and all LEX8 and HEX8 channels
 - Red histogram - without temperature correction
 - Run 953 used as reference
 - Blue histogram - with temperature correction
 - All 384 pedestals for 12 runs are within 1 adc unit





Conclusion

- Correction of pedestals temperature drift allows to improve significantly the stability of pedestals
- To do:
 - Repeat this procedure for towers 2 and 3
 - Implement temperature correction in reconstruction
 - Pedestal corrected based on measured temperature vs time and the time of current event
 - Other possibility: generate separate pedestal file for group of runs with the same temperature
 - and reprocess all BT data