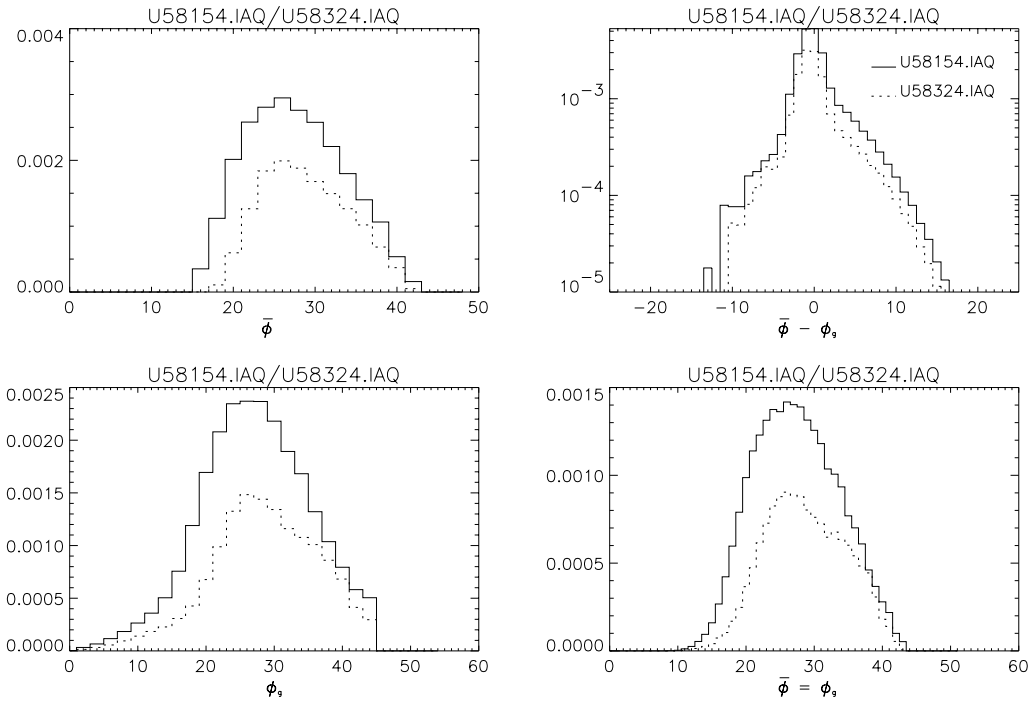
Impact of Solar Mode

- **First tests of a new solar mode (strawman solar mode) took place on TJD 11179 (01-Jan-1999). Summary report COM-RP-UNH-DRG-055.**
- **Modifications to strawman mode led to definition of SOLAR80 mode, first implemented on TJD 11211 (02-Feb-1999) - the start of VP 805.5.**
- **The '80' in SOLAR80 refers to the MODEWRD given to this mode in the COMPTEL data stream.**
- **COMPTEL is currently placed in SOLAR80 mode whenever the Sun is within 60° of the z-axis.**
- **Here we report on a comparison of the instrumental response between the NORMAL mode and the SOLAR80 mode.**
- **A complete report has recently been distributed (COM-RP-UNH-DRG-057, dated 9-May-1999).**

An Important Point!

- **Previous study study of the strawman solar mode provided comparisons with the NORMAL mode (COM-RP-UNH-DRG-055).**

- **Those comparisons showed significant differences that were confined largely to energies below 1 MeV.**



- **That comparison was made between the *baseline* NORMAL mode (i.e., that based on pre-flight calibrations) and the *current* SOLAR80 mode.**

- **A more appropriate comparison is that between the *current* NORMAL mode and the *current* SOLAR80 mode.**

Definition of SOLAR80 Mode

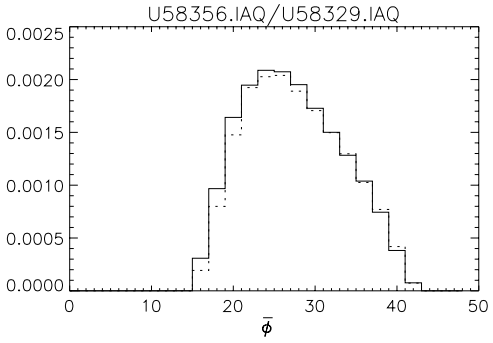
Table 1 – Changes to Gamma-1 Data Stream			
Parameter	**Normal Mode**	**Strawman Solar Mode**	**SOLAR80 Mode**
D1 Lower Threshold (hardware)	all at level 6	all at level 2	all set at level 3
D1 Lower Threshold (DE)	channel 20	channel 32	channel 26
D2 Lower Threshold (DE)	channel 55	channel 55	channel 55
ToF Window	95 – 150	110 – 150	105 – 140
PSD Window	0 – 255	50 – 120	50 – 120

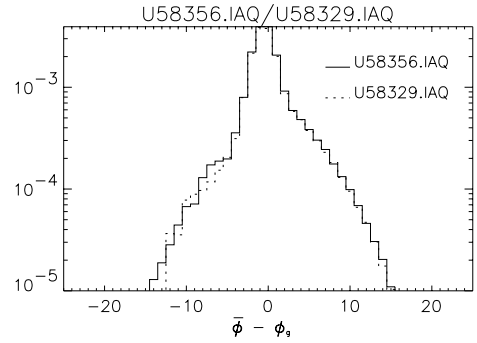
Table 2 – Changes to Gamma-2 Data Stream			
Parameter	**Standard Normal Mode**	**Strawman Solar Mode**	**SOLAR80 Mode**
D1 Lower Threshold (hardware)	all at level 6	all at level 2	all set at level 3
D1 Lower Threshold (DE)	channel 5	channel 32	channel 26
D2 Lower Threshold (DE)	channel 5	channel 55	channel 55
ToF Window	0 – 255	110 – 255	105 – 255
PSD Window	0 – 255	50 – 255	50 – 255

Mode Comparisons

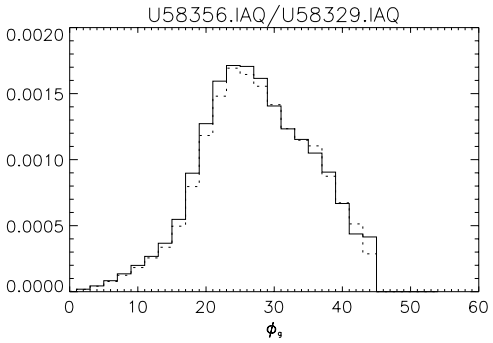
- **For recent comparisons, we have used data collected on TJD 11201 (23-Jan-1999) and TJD 11212 (03-Feb-1999).**
- **Task IFCTHR was used to determine module thresholds.**
- **ISS file generated for use in SIMFIN.**
- **PSFs generated using SIMPSF.**
- **PSFs were generated for the following cases:**
  - **E^{-2} Power-Law at 10° zenith**
  - **E^{-2} Power-Law at 30° zenith**
  - **0.847 MeV line at 10° zenith**
  - **1.238 MeV line at 10° zenith**
  - **1.809 MeV line at 10° zenith**
  - **2.223 MeV line at 10° zenith**

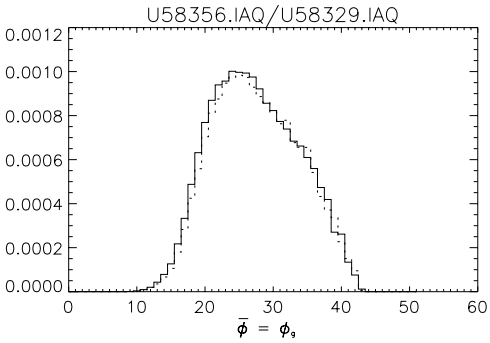
Power–Law at 10° Zenith

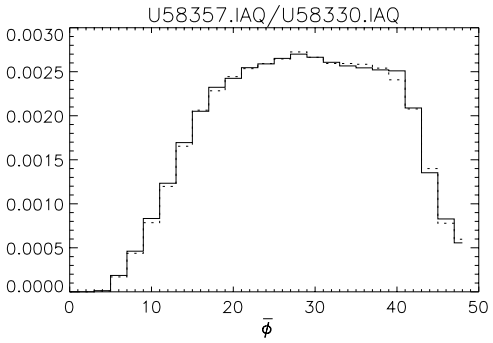


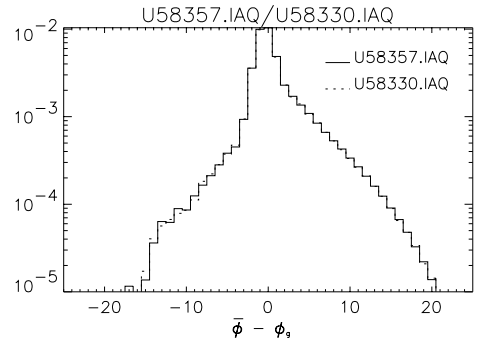


0.75 - 1.0 MeV

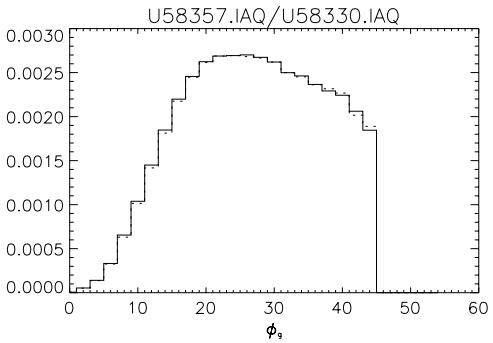


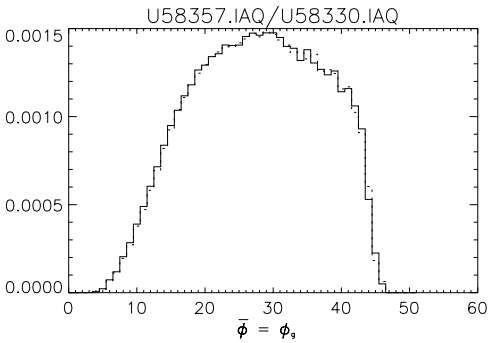




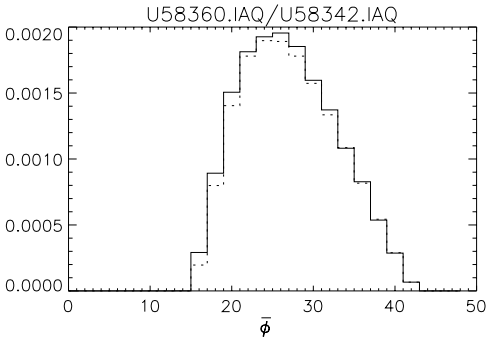


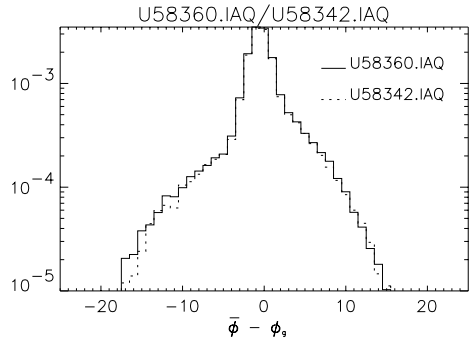
1.0 - 3.0 MeV



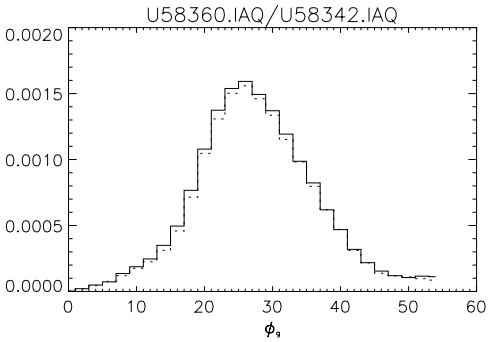


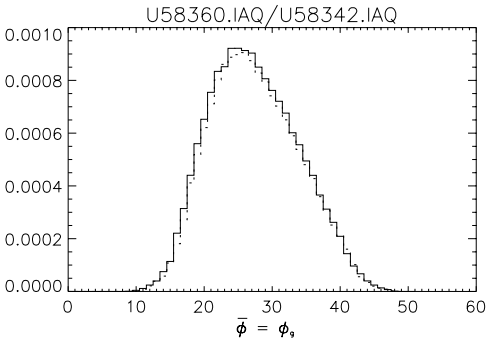
Power–Law at 30° Zenith

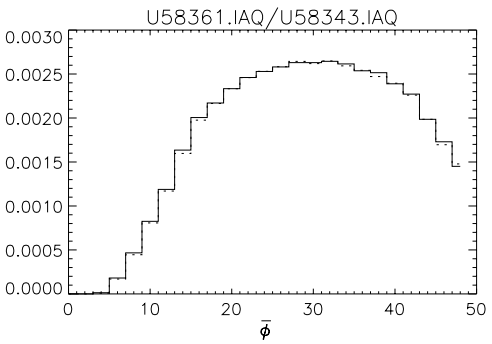


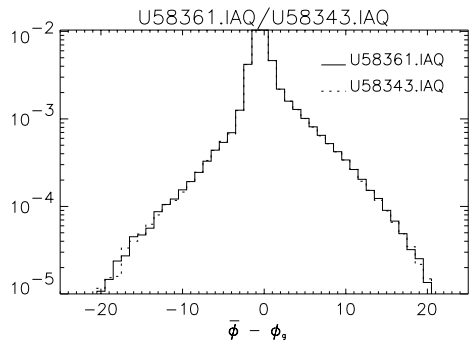


0.75 - 1.0 MeV

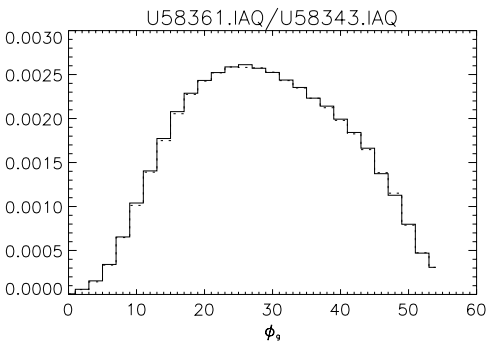


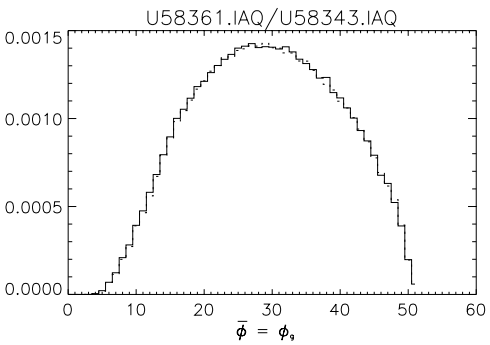




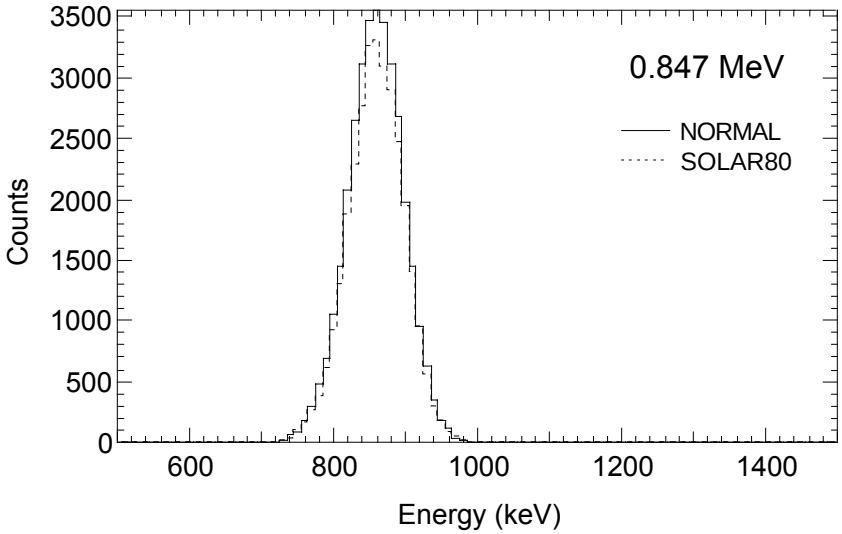


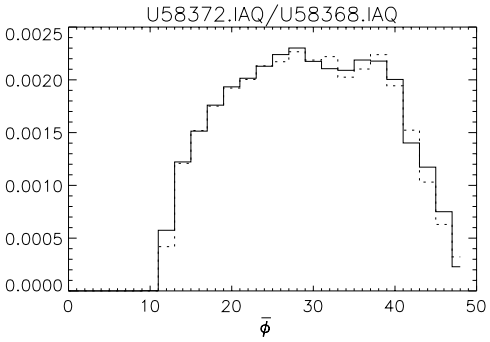
1.0 - 3.0 MeV

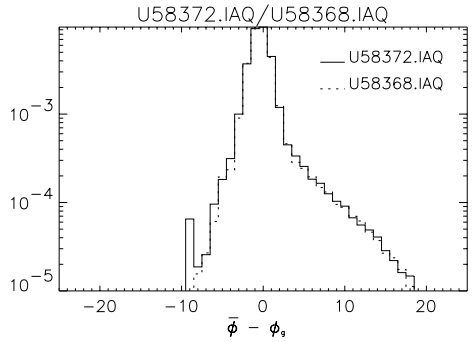


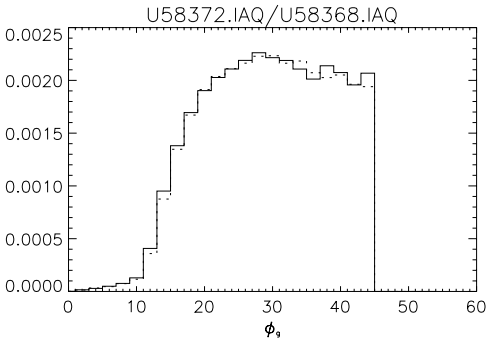


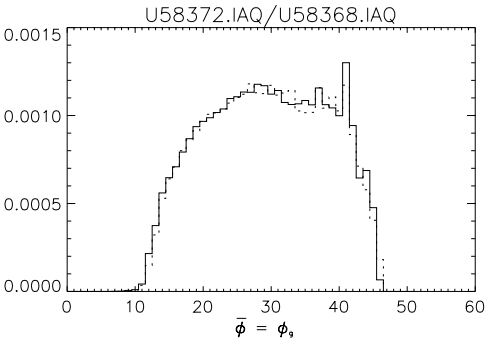
0.847 MeV at 10° Zenith



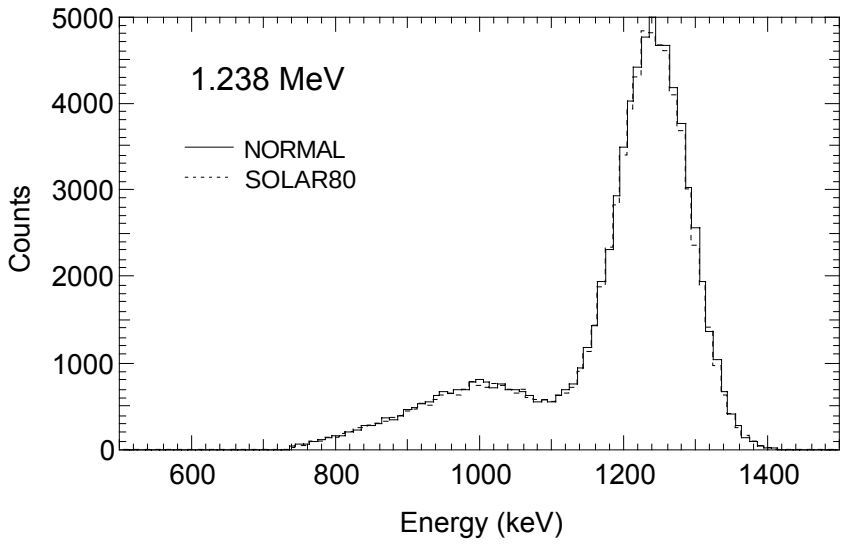


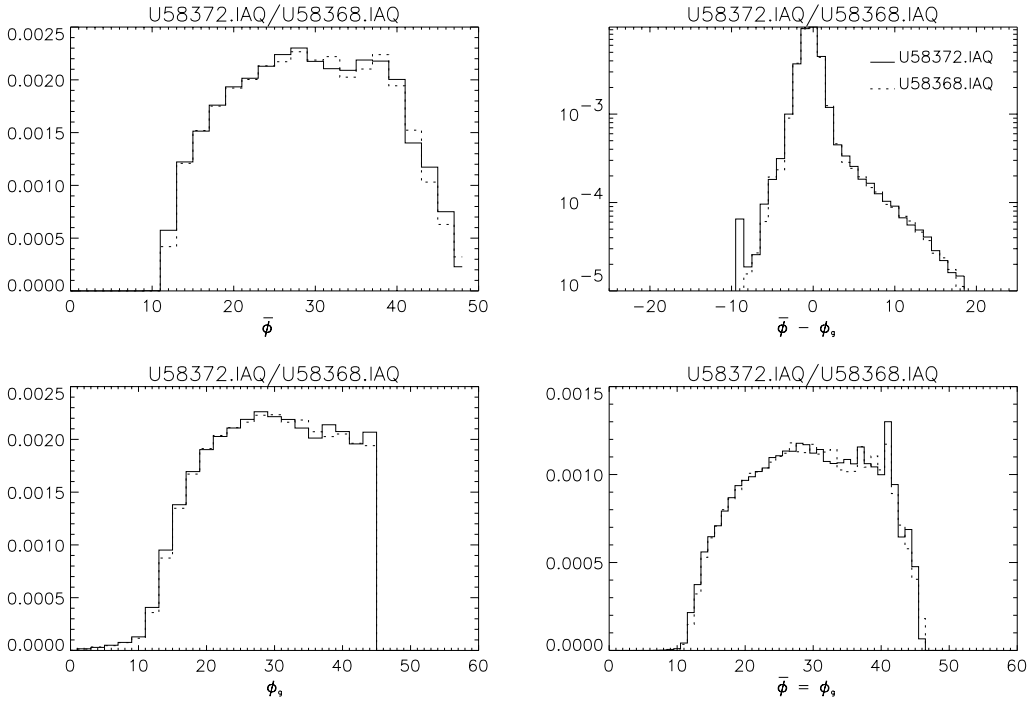




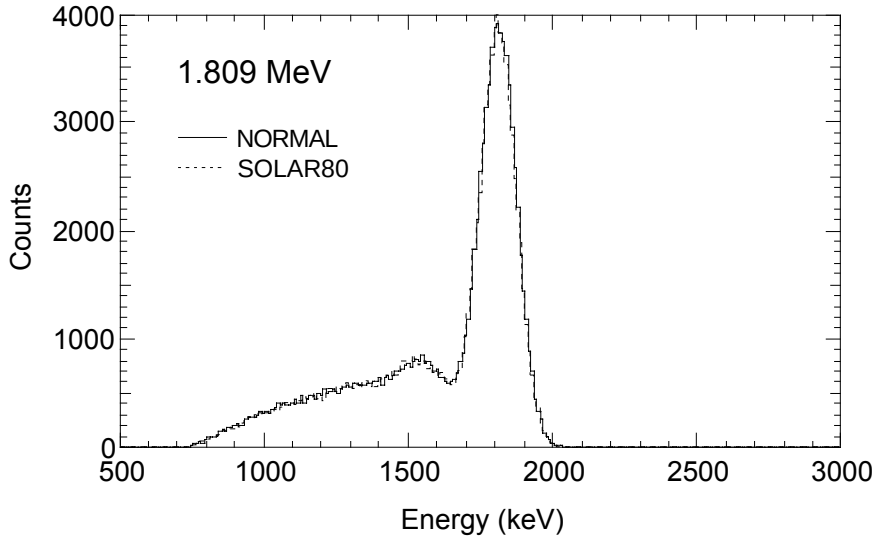


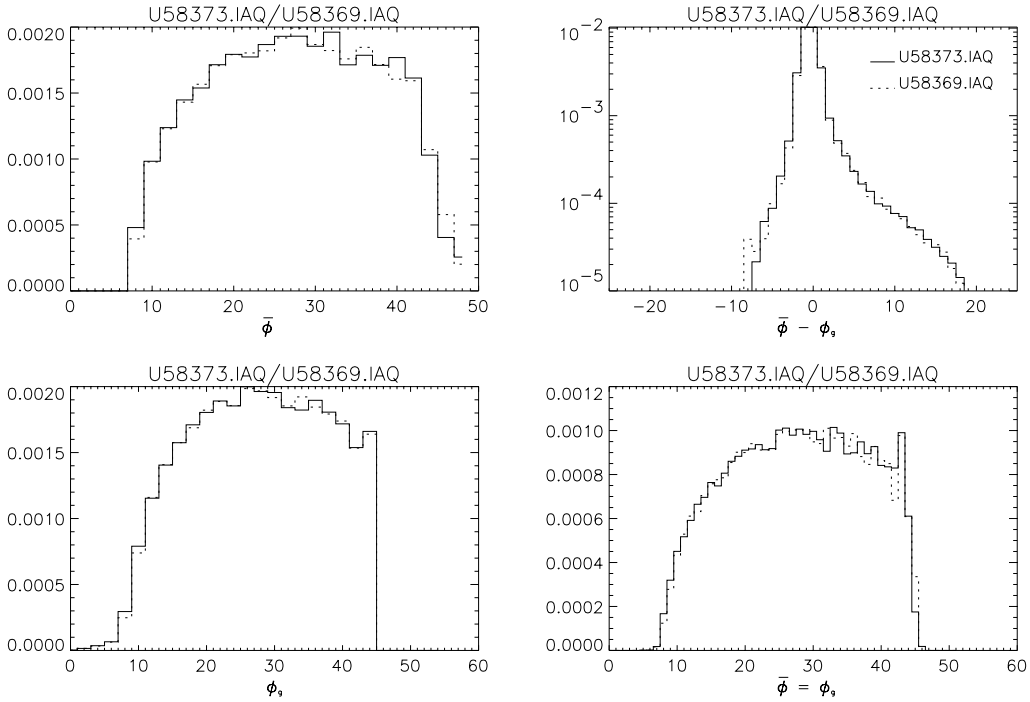
1.238 MeV at 10° Zenith



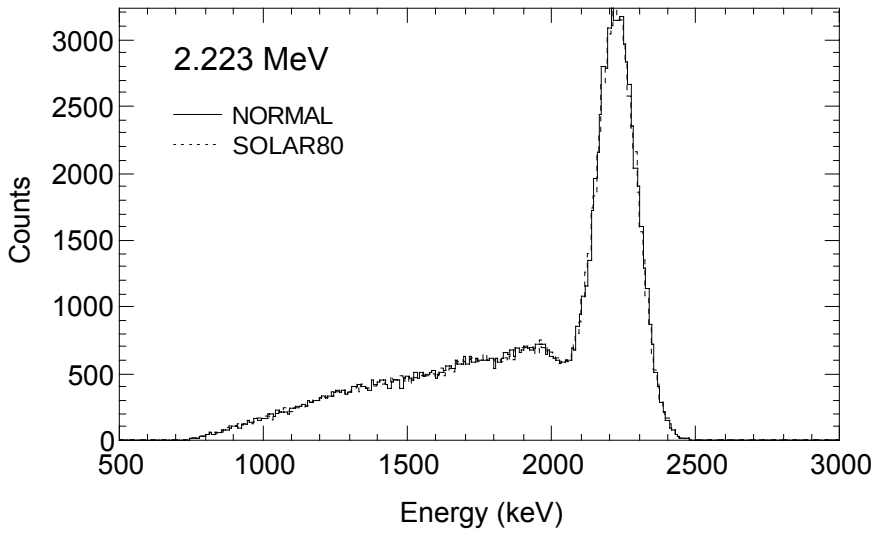


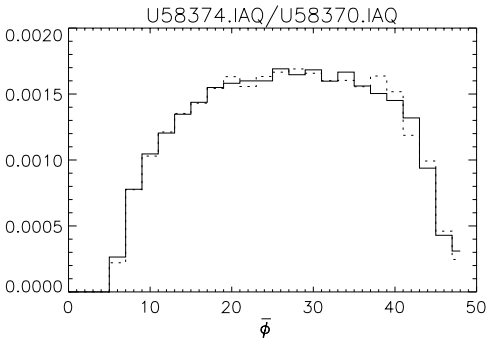
1.809 MeV at 10° Zenith

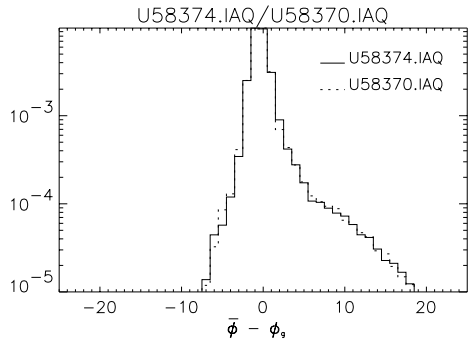


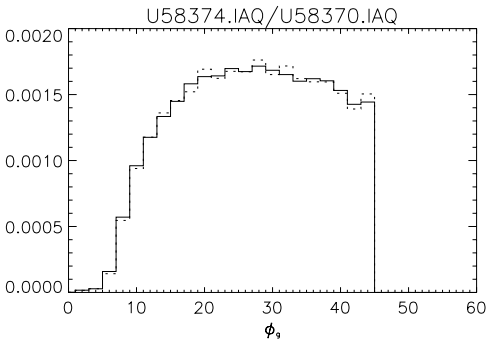


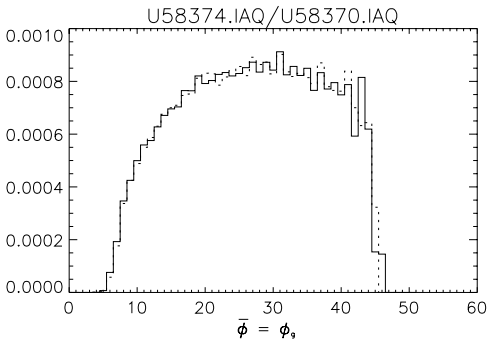
2.223 MeV at 10° Zenith











Comparison of PSF Normalizations

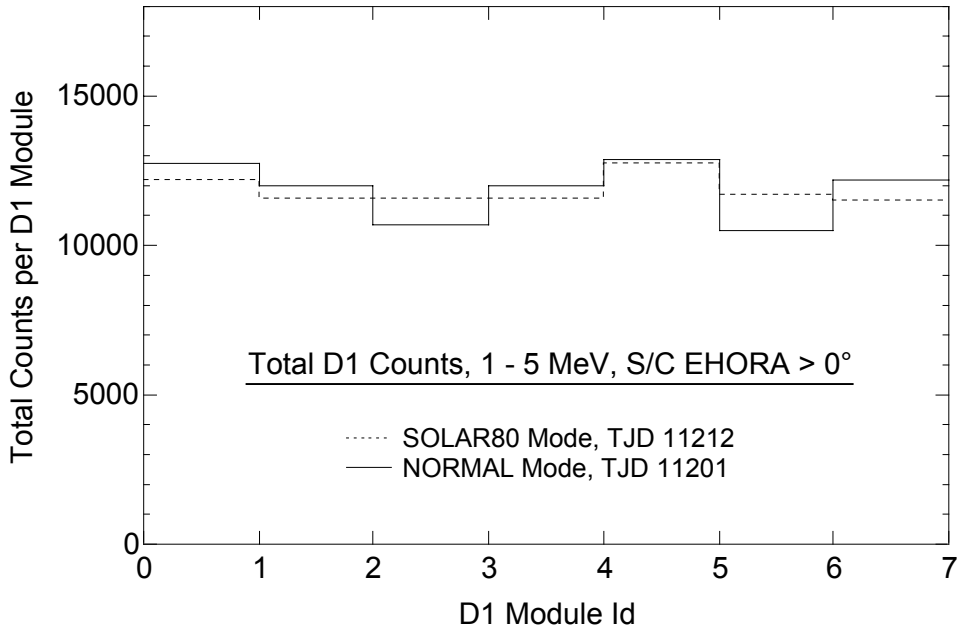
- **For E^{-2} power law at 10° zenith angle:**
  - **3% reduction in normalization for 0.75-1.0 MeV**
  - **<0.5% reduction in normalization for 1.0-3.0 MeV**
- **For E^{-2} power law at 30° zenith angle:**
  - **3% reduction in normalization for 0.75-1.0 MeV**
  - **<0.5% reduction in normalization for 1.0-3.0 MeV**
- **For monoenergetic lines at 10° zenith angle:**
  - **1.5% reduction in normalization at 0.847 MeV**
  - **1.1% reduction in normalization at 1.238 MeV**
  - **0.3% reduction in normalization at 1.809 MeV**
  - **insignificant reduction in normalization at 2.223 MeV**

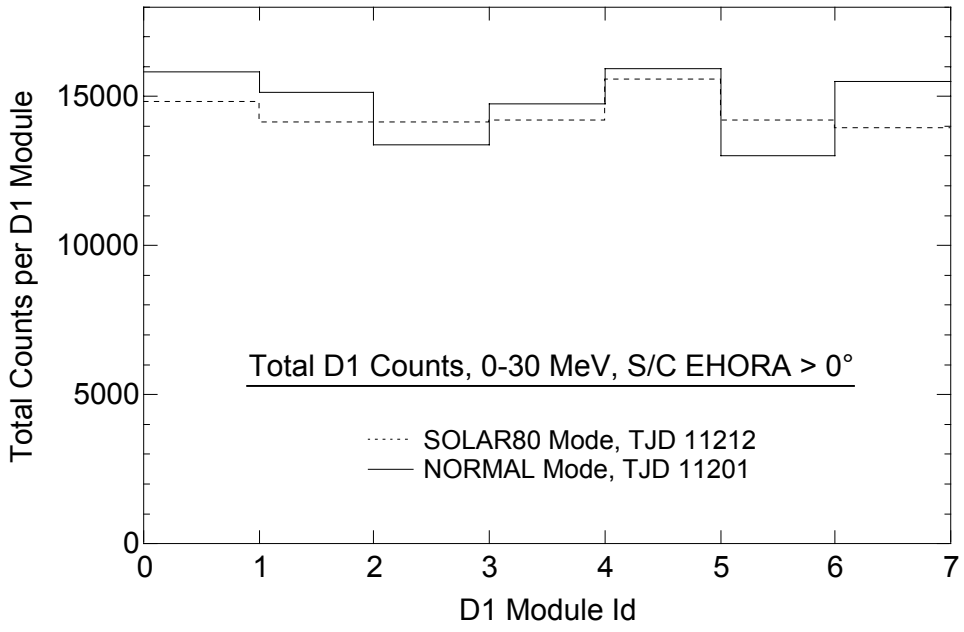
Distribution of Events in D1

- **One concern expressed at last team meeting was with regards to the impact of the narrower ToF window on the distribution of events within D1 (some D1 modules perhaps more influenced than others).**

- **DDMCHK used to compare event distributions for TJD 11201 and TJD 11212, with following selections:**
  - **D1E = 70 keV - 20 MeV**
  - **D2E = 650 keV - 30 MeV**
  - **ToF = 115 - 130**
  - **PSD = 40 - 90**
  - **S/C EHORA > 0°**

Distribution of Events in D1





Summary

- **The SOLAR80 operating mode has minimal impact on the COMPTEL PSF – at most a few percent in the integrated 0.75-1.0 MeV energy band.**

- **The distribution of events within the D1 modules has changed slightly, but is now more uniform in the SOLAR80 mode.**