SIMulation Status Report

- **SIM Web Page has been established :**
  http://wwwgro.unh.edu/comptel/compass/sim/SIM.html

- **Web Page (in principle) contains the following :**
  - **Task descriptions (incl. software users manual, COMPASS profile and version history).**
  - **Dataset descriptions (incl. IDT and ISS).**
  - **QEV and EVP production summaries from each site.**
  - **PSF reports.**
  - **Miscellaneous documentation.**

- **Quality flags for QEV and EVP data generated at UNH have been thoroughly reviewed.**

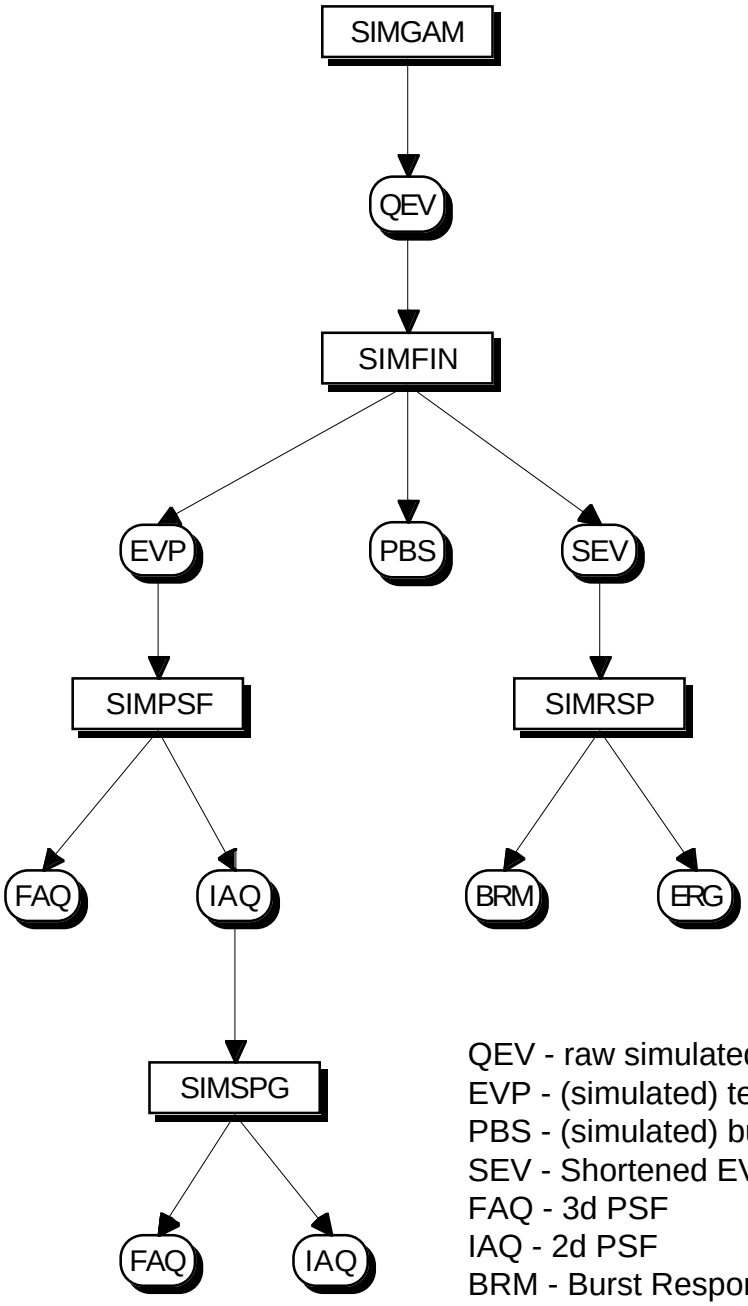
- **Direct simulations for E^{-2} power law spectrum at various zenith angles have been on-going.**

SIM Software Status

- **SIMGAM**
  - **v22 (16-Dec-1997 @ MPE)**
    - » **Includes decay schemes of ^{55}Co and ^{56}Co**
- **SIMENE - unchanged, still at v13**
- **SIMFIN**
  - **v15 (8-Jan-1998 @ MPE)**
    - » **Improved calculation of PSD value**
- **SIMRSP - unchanged, still at v3**
- **SIMPSF - unchanged, still at v11**
- **SIMSPG - unchanged, still at v3**
- **SIMSRV - unchanged, still at v3**

"Final" SIM Architecture

This represents the present software status.



QEV - raw simulated events
EVP - (simulated) telescope events
PBS - (simulated) burst data
SEV - Shortened EVP data (with input energy)
FAQ - 3d PSF
IAQ - 2d PSF
BRM - Burst Response Matrix
ERG - Energy Response Matrix telescope data)

SIM Quality Flags

- **All QEV and EVP data generated at UNH have been reviewed and quality flags assigned.**

- **QEV quality flags :**
  - **SIMGAM v15 or earlier was without secondary particle tracking. These data have been set to -100.**
  - **Narrow incident beam simulations have been shown to differ from wide incident beam simulations. Not reccommended for use. Set to +50. (Should they be set to some negative value?)**
  - **Continual improvements in IDT datasets. Data generated with older IDT datasets may still be of value. These data have been set to +60.**
  - **Data generated using SIMGAM v16 or greater with wide incident beam and with latest IDT datasets have been assigned a value of +110.**
  - **Duplicate datasets (some QEV) have been set to -100.**

- **EVP, IAQ and FAQ quality flags :**

	QEV	EVP	IAQ	FAQ
"bad" or duplicate	-100	-100	-100	-100
Narrow Beam	+50	+50	+50	+50
Old IDT	+60	+60	+60	+60
Latest & Greatest	+110	+160	+220	+220

Direct Simulations

- **Goal has been to generate 3 million QEV events for an incident E^{-2} spectrum at various zenith angles (0°, 10°, 20°, 30°, 40° and perhaps 50° and 60°).**

- **To date, a complete set of QEV events have been generated for 10°, 20° and 30°. Sets of QEV events for 0° and 40° are nearly complete.**

- **'Standard' EVP data have been generated with SIMFIN:**
  - **Location smearing applied**
  - **No ToF broadeing (present algorithm not updated)**
  - **No PSD broadening**
  - **Pre-flight calibration thresholds (UNH-ISS-1008)**

- **'Standard' PSFs have been generated with SIMPSF.**
  - **Standard Energy bands (0.75-1, 1-3, 3-10, 10-30)**
  - **D1E = .07 - 20 MeV**
  - **D2E = .65 - 30 MeV**
  - **PSD = 0 - 110**
  - **2° phibar binning**
  - **1° phigeo binning**

- **Data being distributed to all sites.**

Generating PSFs from Direct Simulation Data

- **SIMPSF can be used directly to generate PSFs with:**
  - **arbitrary energy selections (D1E, D2E, ETOT)**
  - **arbitrary phibar binning**
  - **arbitrary phigeo binning**
  - **arbitrary PSD range**
  - **arbitrary ToF range (in principle)**

- **SIMFIN-SIMPSF can be used to generate PSFs with:**
  - **arbitrary QEV selection set**
  - **different module thresholds (ISS dataset)**
  - **different veto thresholds (ISS dataset)**
  - **different energy resolutions (ISS dataset)**
  - **different location resolutions (ISS dataset)**
  - **different ToF resolutions (ISS dataset)**

- **Some SIMFIN/SIMPSF parameters must be entered by the user and be consistent with those used to generate the QEV data:**
  - **Run Mode (SIMFIN, SIMPSF)**
  - **Source Zenith (SIMPSF)**
  - **Source Azimuth (SIMPSF)**
  - **Beam Type (SIMPSF)**

- **"Number of Incident Photons" specified in SIMPSF provides the PSF normalization.** ***This corresponds to the number of incident photons in the ETOT energy range.***

Synthesized PSFs

Some documents are available to document the status of the SIM processing:

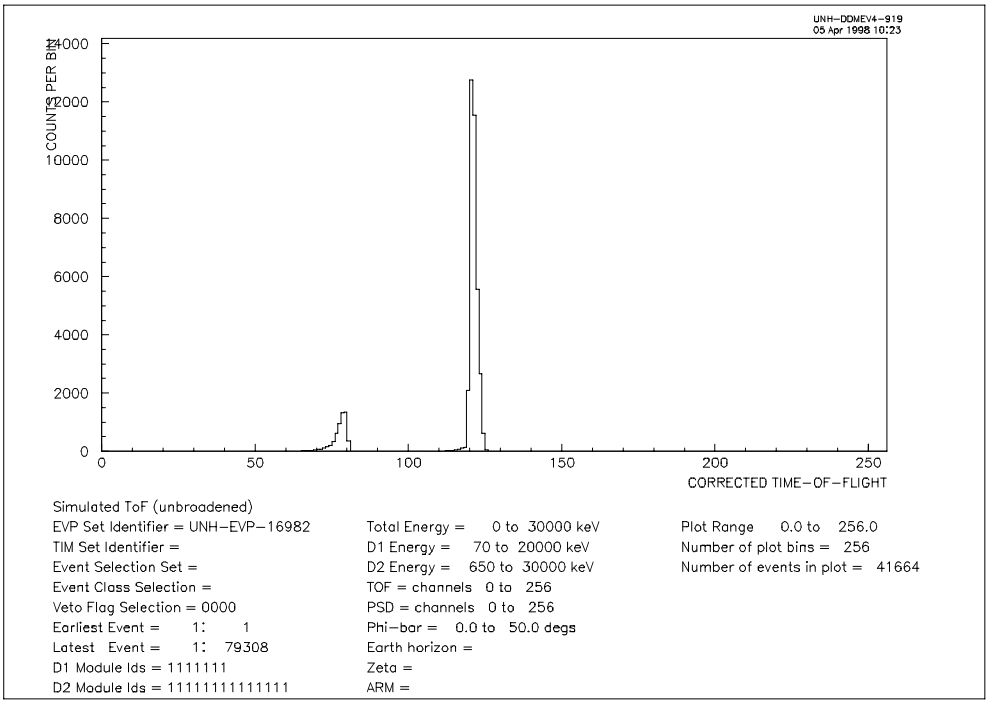
- **COM-RP-UNH-SIM-054 (19-Jan-1998)**
  PSF Library Simulations at 30° Zenith Angle (Wide Beam)
  - **PSD = 0-110; ToF = 90-150; phibar = 1°**
  - **PSD = 0-110; ToF = 115-130; phibar = 2°**
  - **PSD = 60-90; ToF = 90-150; phibar = 1°**
  - **PSD = 60-90; ToF = 90-150; phibar = 2°**
  - **In each case: 0.75-1, 1-3, 3-10, 10-30, 0.75-30, 1-30 MeV**

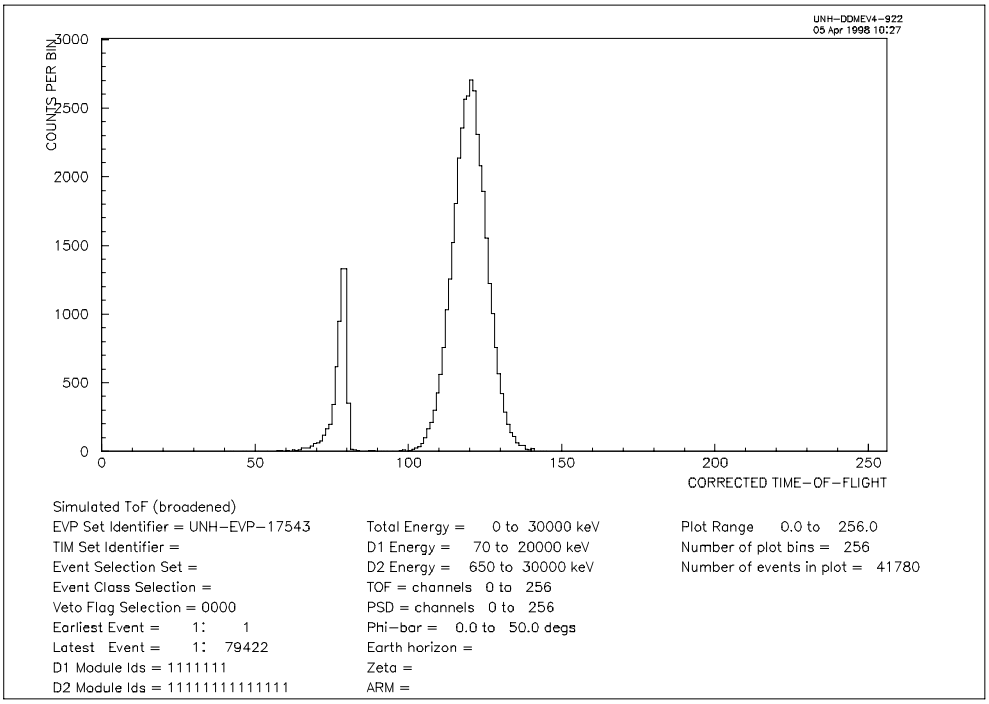
- **COM-RP-UNH-SIM-055 (5-Jun-1997)**
  PSF Library Simulations at 40° Zenith Angle (Wide Beam)
  - **PSD = 0-110; ToF = 115-130; phibar = 2°**
  - **0.75-1, 1-3, 3-10, 10-30, 0.75-30, 1-30 MeV**

- **COM-RP-UNH-SIM-056 (23-Sep-1997)**
  PSF Library Simulations at 10° Zenith Angle (Wide Beam)
  - **PSD = 0-110; ToF = 90-150; phibar = 1°**
  - **PSD = 0-110; ToF = 90-150; phibar = 2°**
  - **PSD = 60-90; ToF = 90-150; phibar = 1°**
  - **PSD = 60-90; ToF = 90-150; phibar = 2°**
  - **In each case: 0.75-1, 1-3, 3-10, 10-30, 0.75-30, 1-30 MeV**

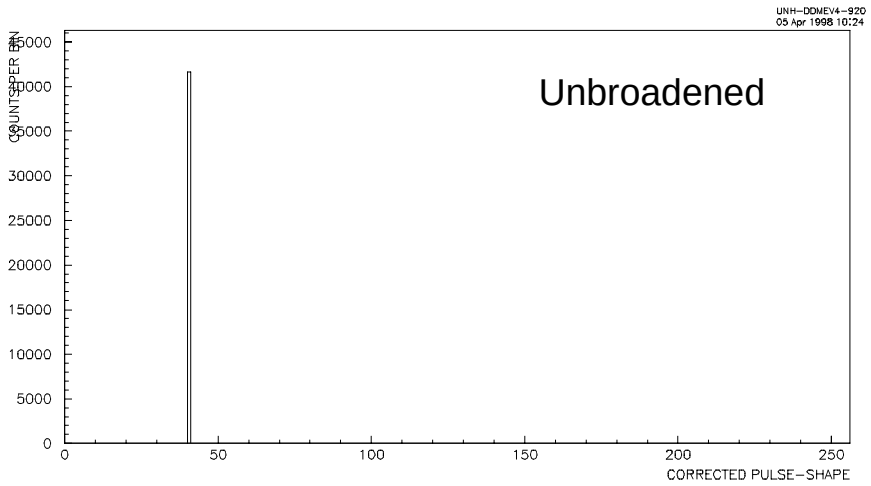
Simulated ToF Data

Present broadening scheme not up-to-date!





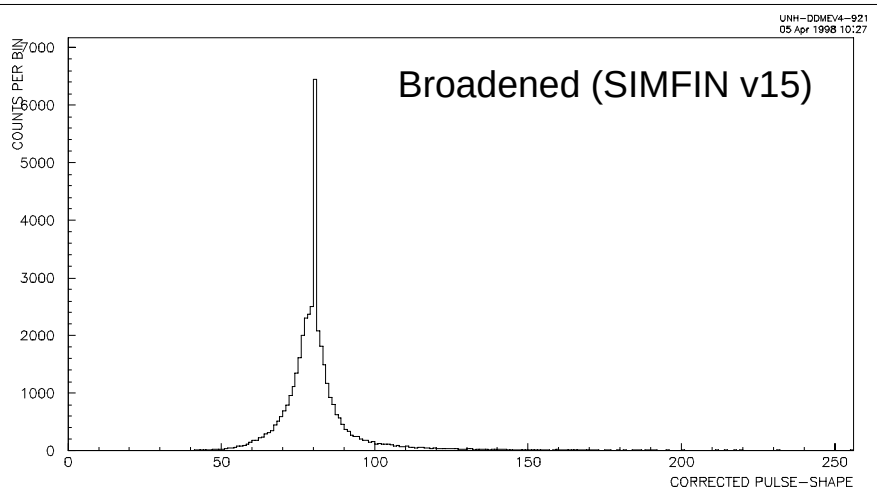
Simulated PSD Data



Simulated PSD (unbroadened)
EVP Set Identifier = UNH–EVP–16982
TIM Set Identifier =
Event Selection Set =
Event Class Selection =
Veto Flag Selection = 0000
Earliest Event = 1: 1
Latest Event = 1: 79308
D1 Module Ids = 1111111
D2 Module Ids = 11111111111111

Total Energy = 0 to 30000 keV
D1 Energy = 70 to 20000 keV
D2 Energy = 650 to 30000 keV
TOF = channels 0 to 256
PSD = channels 0 to 256
Phi–bar = 0.0 to 50.0 degs
Earth horizon =
Zeta =
ARM =

Plot Range 0.0 to 256.0
Number of plot bins = 256
Number of events in plot = 41664

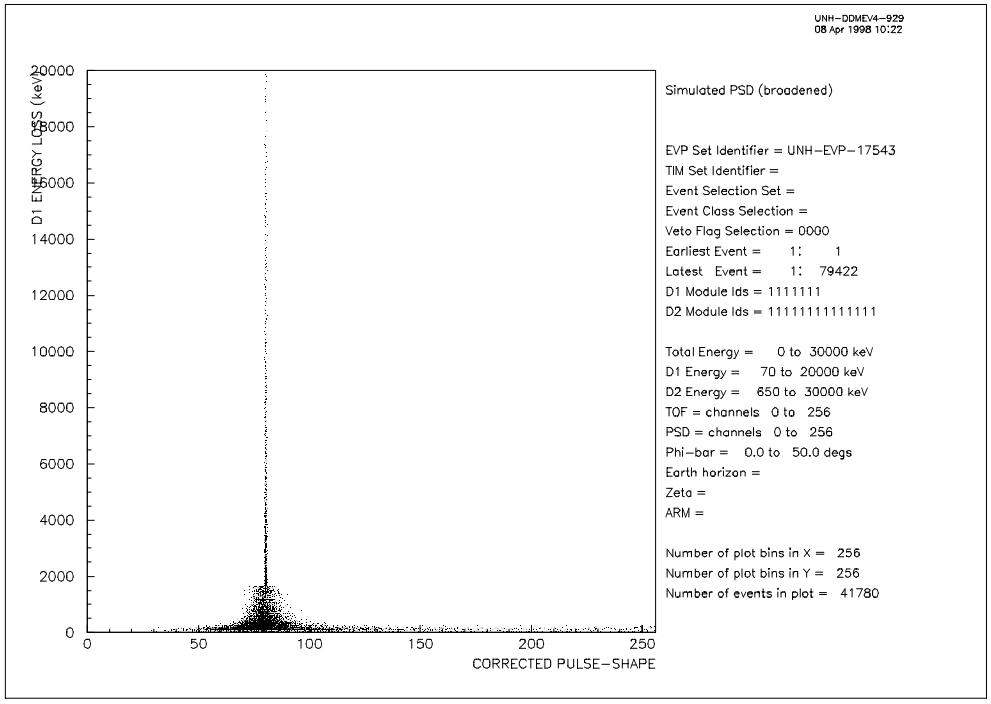


Simulated PSD (broadened)
EVP Set Identifier = UNH–EVP–17543
TIM Set Identifier =
Event Selection Set =
Event Class Selection =
Veto Flag Selection = 0000
Earliest Event = 1: 1
Latest Event = 1: 79422
D1 Module Ids = 1111111
D2 Module Ids = 11111111111111

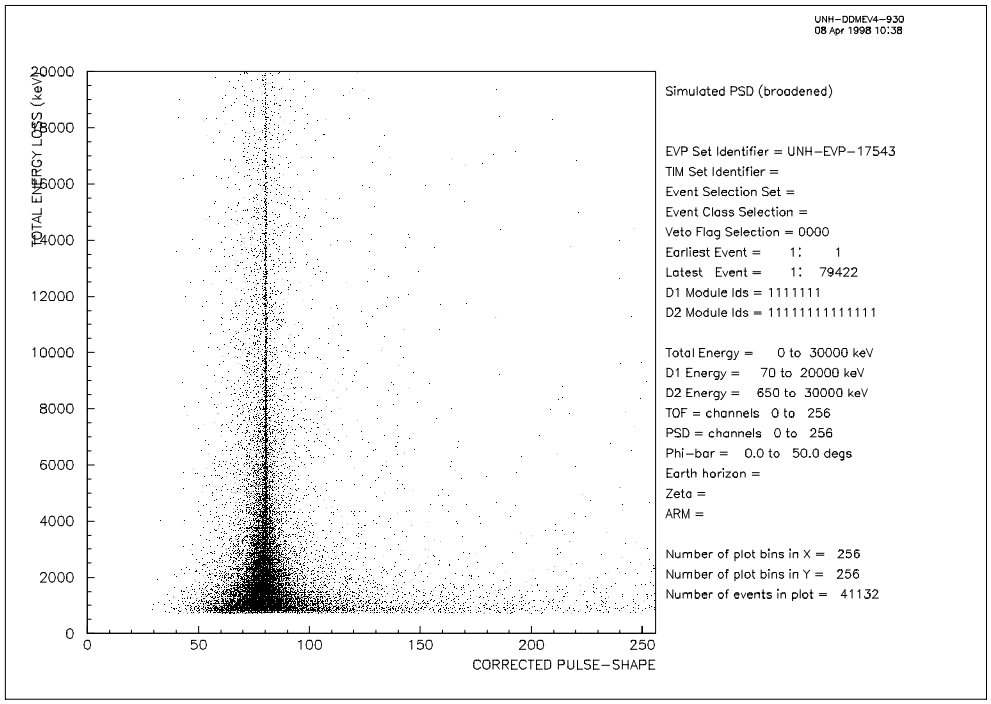
Total Energy = 0 to 30000 keV
D1 Energy = 70 to 20000 keV
D2 Energy = 650 to 30000 keV
TOF = channels 0 to 256
PSD = channels 0 to 256
Phi–bar = 0.0 to 50.0 degs
Earth horizon =
Zeta =
ARM =

Plot Range 0.0 to 256.0
Number of plot bins = 256
Number of events in plot = 41780

Simulated PSD Data

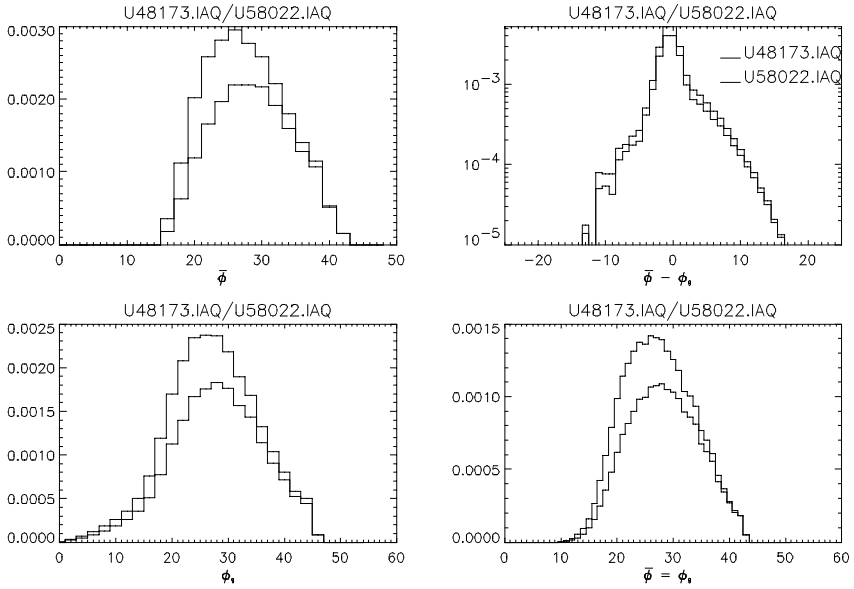


PSD vs D1E

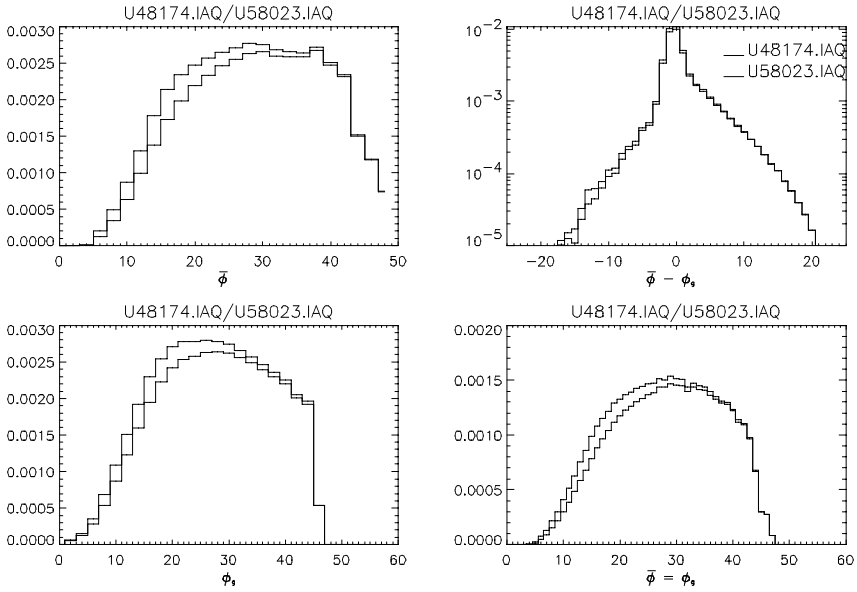


PSD vs ETOT

Impact of PSD Selections on PSF

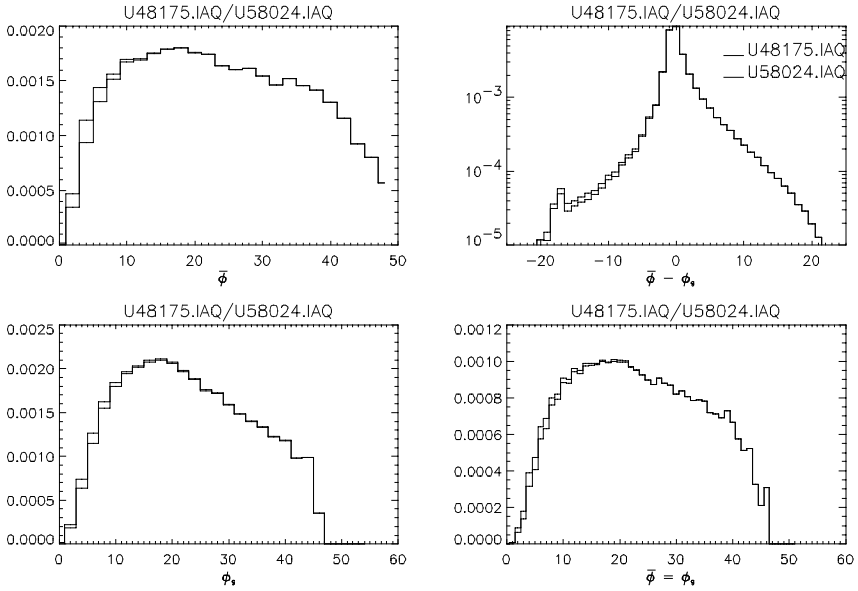


0.75 - 1.0 MeV
48173 - Standard PSF (PSD = 0-110) ; 58022 - PSD = 65-90

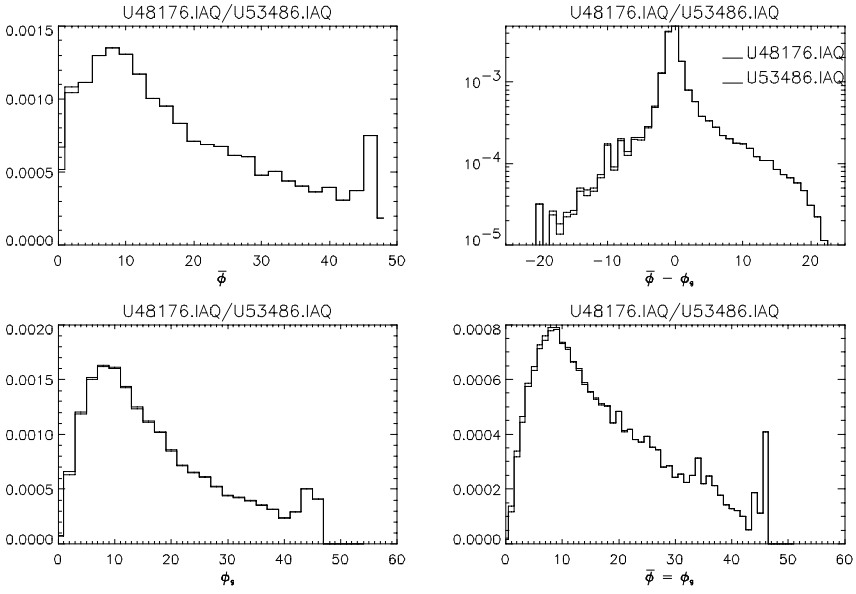


1.0 -3.0 MeV
48174 - Standard PSF (PSD = 0-110) ; 58023 - PSD = 65-90

Impact of PSD Selections on PSF

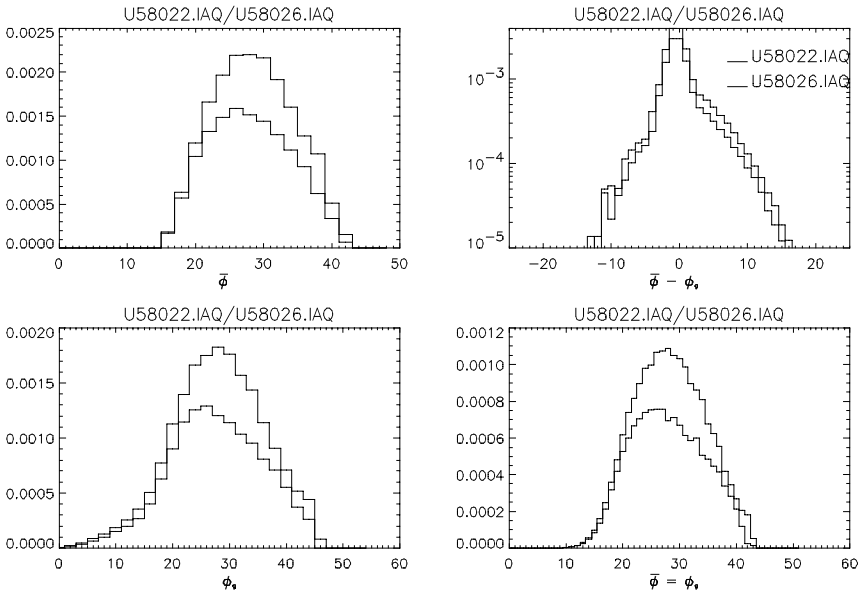


3.0 - 10.0 MeV
48175 - Standard PSF (PSD = 0-110) ; 58024 - PSD = 65-90



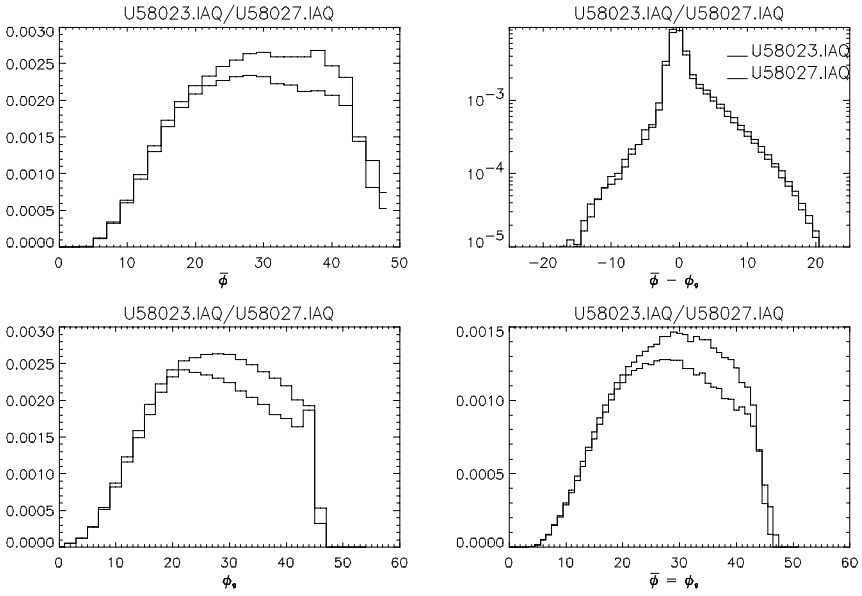
10.0 - 30.0 MeV
48176 - Standard PSF (PSD = 0-110) ; 53486 - PSD = 65-90

Impact of Modified Thresholds on PSF



0.75 - 1.0 MeV

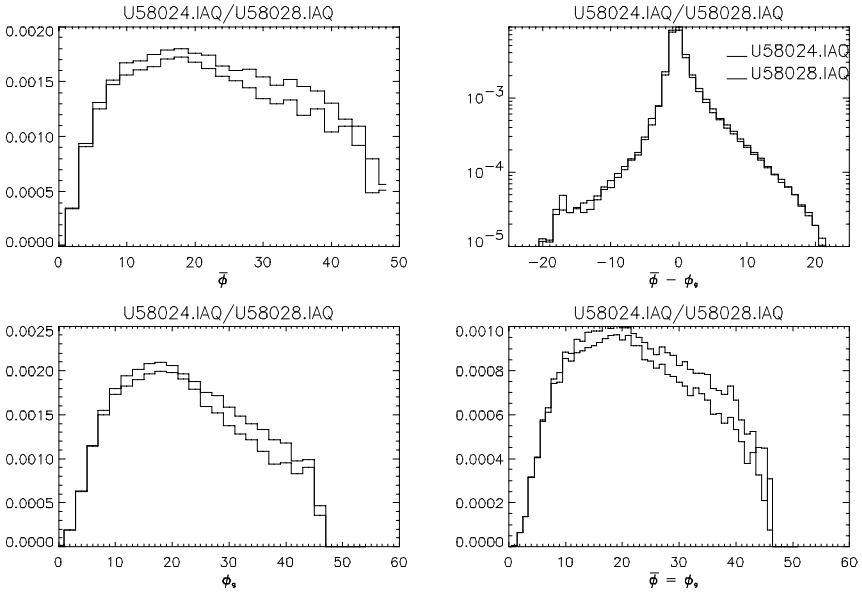
58022 - Standard Thresholds ; 58026 - VP 511.5 Thresholds



1.0 - 3.0 MeV

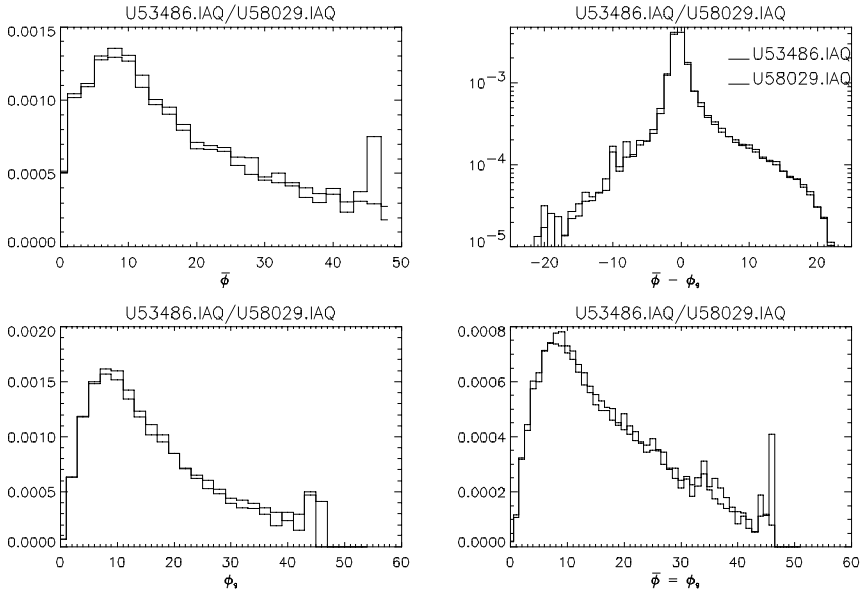
58023 - Standard Thresholds ; 58027 - VP 511.5 Thresholds

Impact of Modified Thresholds on PSF



3.0 - 10.0 MeV

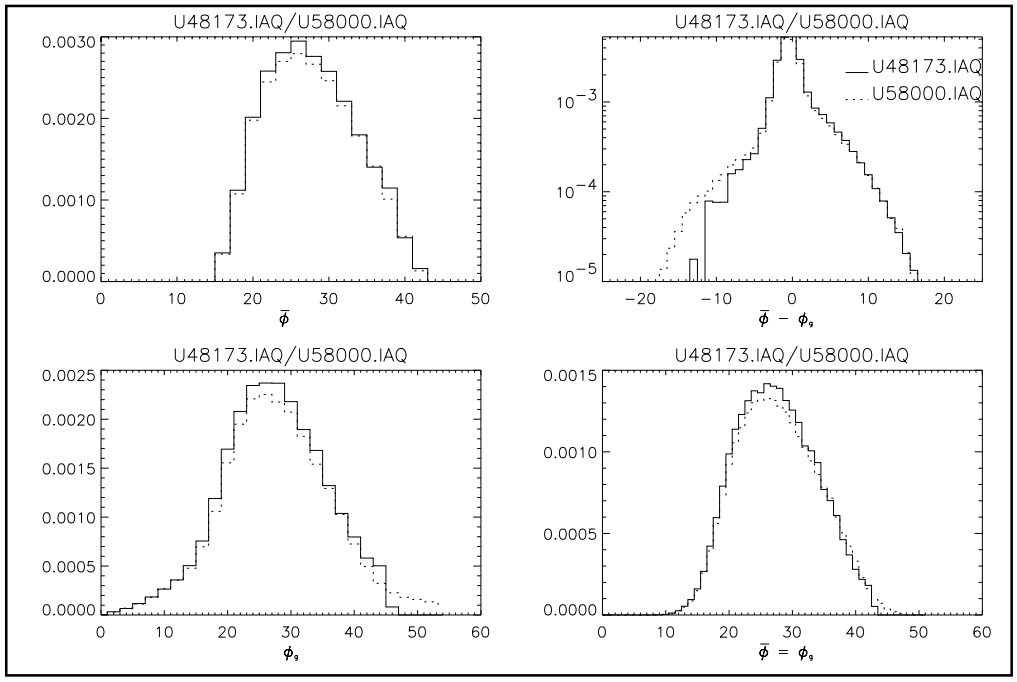
58024 - Standard Thresholds ; 58028 - VP 511.5 Thresholds



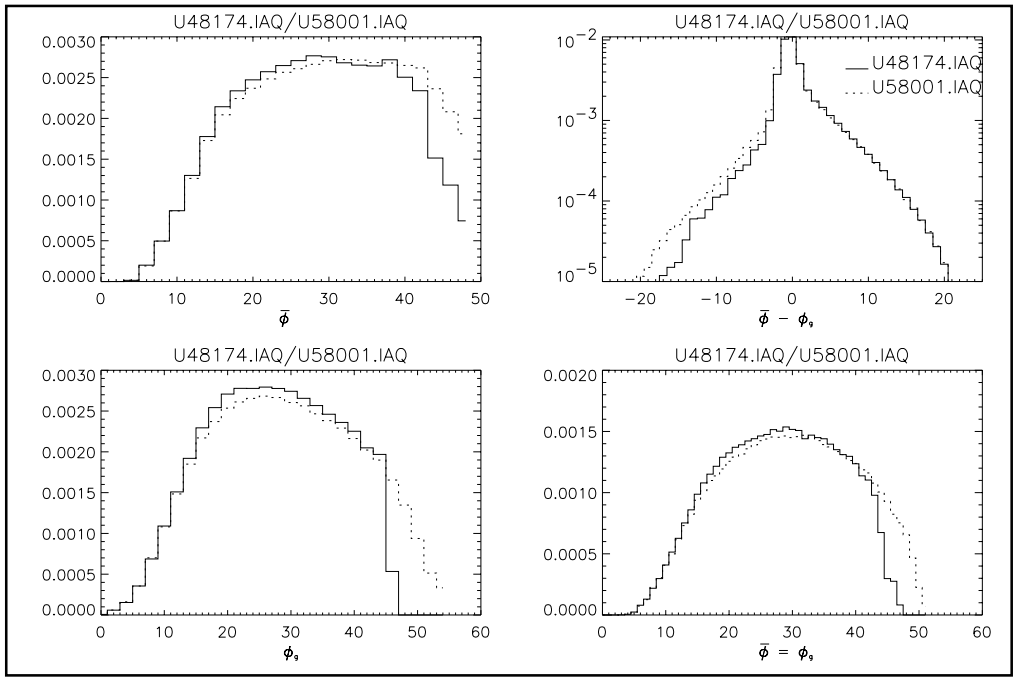
10.0 - 30.0 MeV

53486 - Standard Thresholds ; 58029 - VP 511.5 Thresholds

Dependence on Zenith Angle (10° vs 30°)

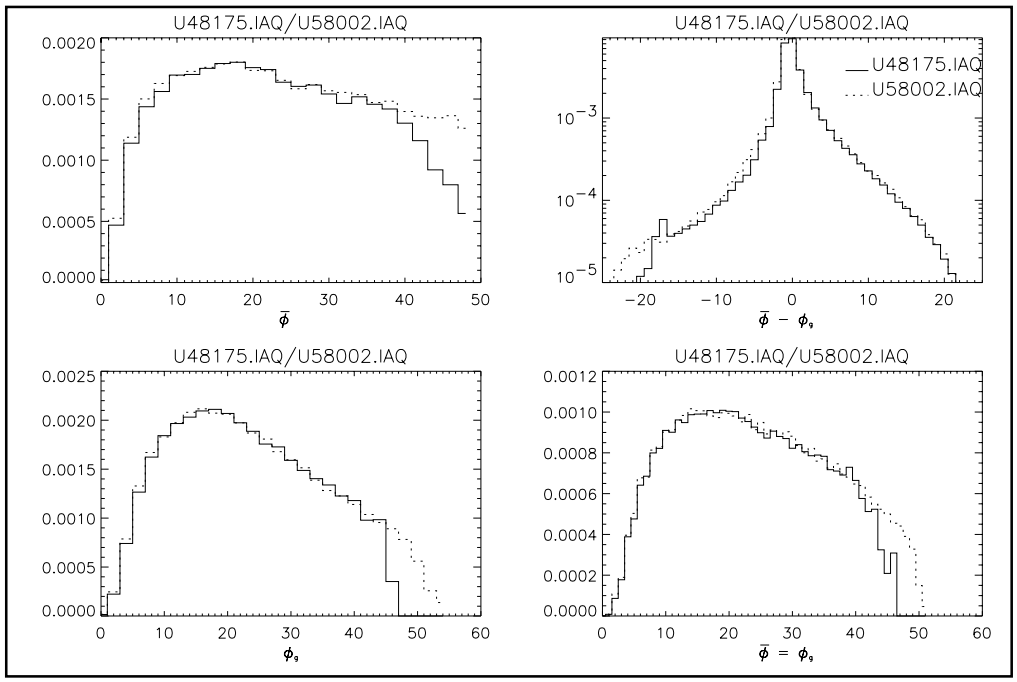


0.75-1 MeV

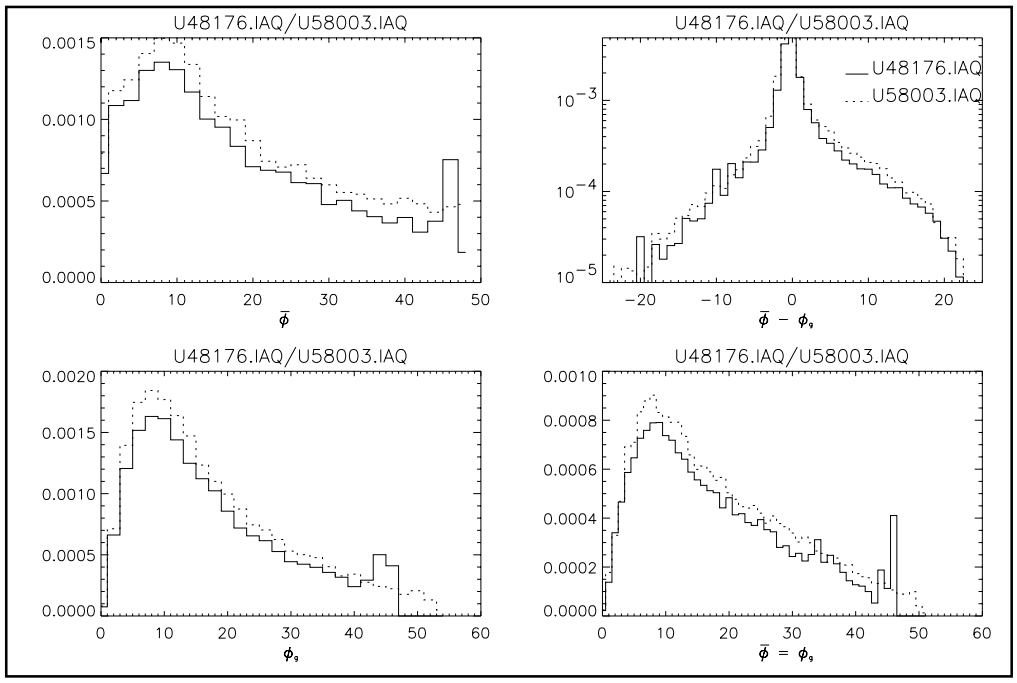


1-3 MeV

Dependence on Zenith Angle (10° vs 30°)



3-10 MeV



10-30 MeV