directions.

In calibration, the rate, in counts/s, of each energy and/or TOF bin is converted to flux i.e. differential intensity (1/cm**2-sr-s-keV).

Calibration

The calibration parameters are ideally be determined through a combination of all of the following: ground measurements; analysis of the in-flight calibration alpha-particle source; modeling; intercalibration with known measurements. Currently only the final method has been employed, which has the obvious drawback of not providing an independent determination of the absolute flux. Therefore the fluxes provided in CODMAC Level 3 data should not be used as is to conduct science that is relying on absolute fluxes for scientific interpretation unless the user determines the fluxes independently.

Brief summaries of the flux and PHA calibrations are given here. See McNutt et al. (2008) [MCNUTTETAL2008A] and the SOC Instrument Interface Control Document (distributed with this archive) for details.

Flux Calibration

The calibration quantities are energy pass-band (dE = Ehi - Elo, lower and upper limit of the energies of the particles measured), measurement efficiency (N, the fraction of valid incident particles that are actually measured), the geometry factor (G, the measurement of the physical detector size and solid angle subtended by the field of view). These values are all given and applied with uncertainties in the CODMAC Level 3 files.

The differential intensity, j (1/cm**2-sr-s-keV), is calculated in terms of the counts C, time coverage T (s), geometric factor G (cm**2-sr), upper and lower energy bounds Ehi and Elo (keV), and detection efficiency N:

$$j = (C/T)/(G * dE * N),$$

where dE = Ehi - Elo.

The uncertainty values assume Poisson statistics for C, no error in T, absolute errors in G, Ehi, Elo and relative error in N. I.e., formally the counts are C = C +/- deltaC, the energies are E = E +/- deltaE, the geometry factor is G = G +/- deltaG. The efficiency is N = [N * epsilon or N / epsilon], where epsilon = deltaN/N, to one sigma confidence.

In this initial delivery of the PEPSSI data from the Launch and Jupiter phases of the New Horizons mission these values are supplied to convert the instrument specific data (e.g., count rates) into physical instrument-independent units (e.g., differential intensity), as well as computing the physical quantities themselves. It must be stressed that these are preliminary values that should not be used without significant effort from the user to understand their limitations (see the SOC Instrument ICD, provided with this archive, and McNutt et