URL: http://cxc.harvard.edu/chart/faq.html
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Why use ChaRT instead of the PSF libraries?

The usage of the standard PSFs libraries for a detailed spatial/spectral analysis has limitations mainly due to the coarse energy and spatial grids, especially for large off−axis angles. ***ChaRT retrieves a PSF for any point on the detector and any energy, using no grids at all***.

The standard PSF library files consist of two dimensional simulated monochromatic PSF images ``postage stamps'' (only for energies ranging from 0.277 keV to 8.6 keV), made using SAOsac and projected onto ideal detector planes (see the PSF library caveats). They are stored in multi−dimensional FITS images (hypercubes) with azimuth and elevation steps (in telescope fixed system) of either 1 arcminute or 5 arcminutes. The user can extract the desired PSF model image from a library file by interpolating within the energy and off−axis angle grids, using the Chandra Interactive Analysis of Observations package (CIAO) tool mkpsf.

The PSF library grids are very coarse: azimuth and elevation angular off−sets of 1' or 5', only 5 energies, and only one defocus position. Therefore, the user needs to interpolate in these grids to get a PSF for the off−axis angle and the energies (spectrum) of the observed source.

A vivid demonstration of the coarseness of interpolation is given in Figure 1 which shows the 8 files that mkpsf uses to obtain the PSF shown in the center. These files are the PSF model images in hypercube 4 at the four corners surrounding the desired location (THETA=0.5 arcmin, PHI=0), for two energies in the grid (1.4967 keV and 4.5 keV).

Figure 2 shows the interpolation used to obtain a PSF at a larger off−axis angle (THETA=10.5 arcmin, PHI=0). These 8 files are the PSF model images in hypercube 2 at the four corners surrounding the desired location. The same two energies were used.

ChaRT can generate a PSF for a given on−axis or off−axis location with no interpolation required. The HRMA PSFs can be generated for many different energies or spectra, and not just for few energies as is the case for the standard libraries. Using ChaRT rays in MARX one can generate more realistic model PSFs containing detector information. The number of rays (flux) can be also selected unlike in the standard PSF libraries.

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