Variance-resolution trade-offs and different data types

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Abstract

Comparing different data samples in terms of their variance resolution trade-offs.

1 Methods

- Prepare N=10 samples of simulated data with n=10^6 events in each sample.

- Use different PSF for different data types along with different sensitivities.

- Reconstruct using plain (unconstrained) MLEM.

- After niter=100,200,... apply a post-smoothing Gaussian kernel with different parameter sigma; assume the given sigma*2.35 is the resolution of the image.

- Combine samples together to extract mean estimated value and its variance.

- Extract average value in the hot pixel by multiplying the average image with the (properly rotated) model phantom and dividing by number of hot pixels in the phantom. Scale the variance by the average value in the hot pixel to get a feeling on the variation strength.

- The variance of the image is the integral of the variance histogram over selected area (WHOLE, DISC, ...)
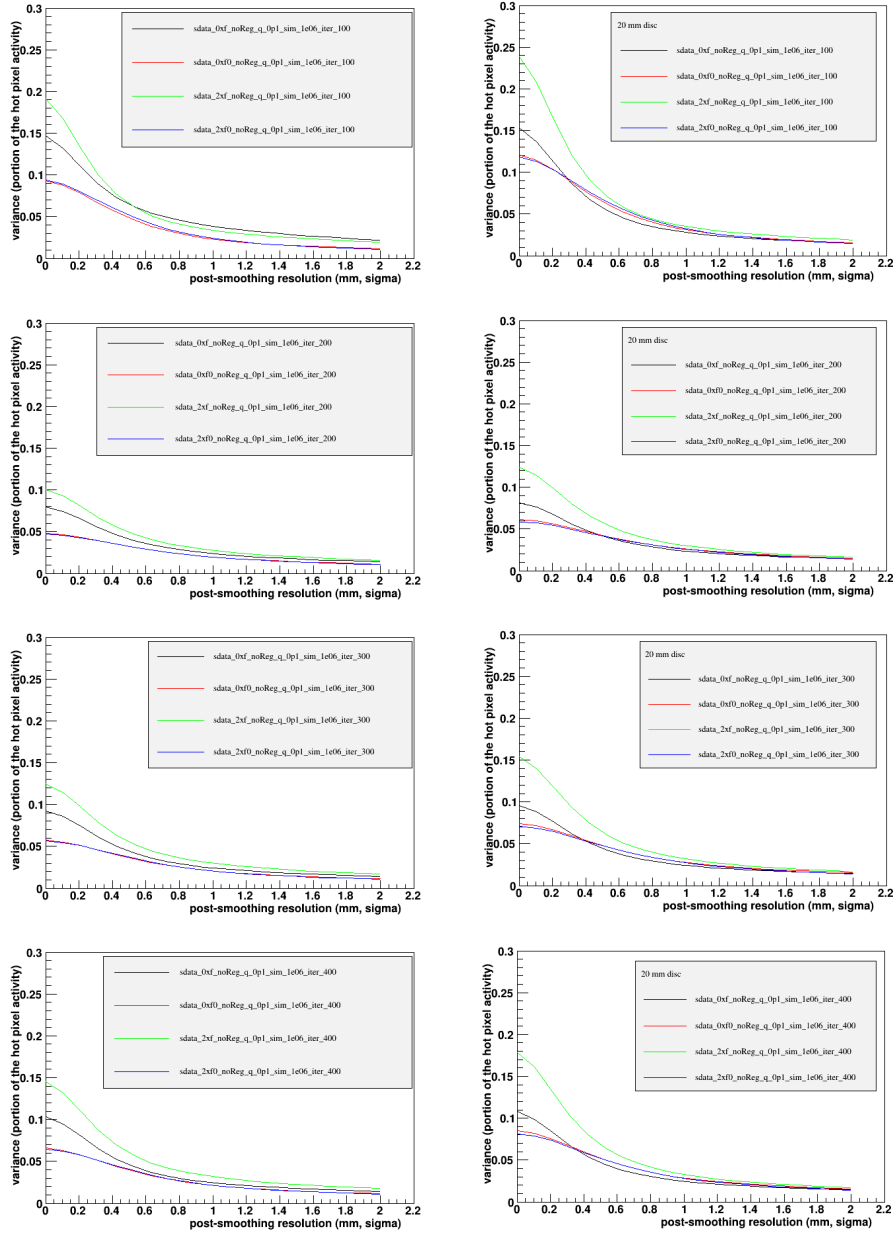
2 Plots

Figure 1: Reconstruction for niter=100,200,300 and 400. Left: WHOLE image used as the variance sampling region. Right: DISC with a radius of 20 mm chosen as the sampling region.