The high energy, high position resolution of 3-D, pixelated CdZnTe detectors enables a wide variety of imaging modalities. Higher energy gamma-ray sources can be reconstructed via Compton imaging (CI) while lower energy sources are imagable via coded aperture (CA). Stochastic Origins Ensembles (SOE), a Bayesian technique relying on Markov Chain Monte Carlo (MCMC), can be used to improve reconstructed image quality over traditional simple back-projection (SBP). SOE successfully deconvolves detector response while returning comparable image quality to MLEM on measured point sources.

Algorithm Description:
Histogram origins for density estimate

Parallelization Capabilities:
Histogram update:
- Highly parallelizable
- Source dep. I(θ, φ)

Point Picking:
- Completely parallelizable
- GTX 970 GPU: OpenCL
- Rings: random #
- Attenuation: ray-tracing

MCMC Chain Behavior:
Burn in
Posterior sampling

Performance Simulation:
CI, SBP
CA, SBP

Performance Meas.:
CI, SOE
CA, SOE

Compton Imaging:
- Sequencing
- Scatter uncertainty
- Detector attenuation

References: