Handling noise in X-ray flash diffraction imaging

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Linac Coherent Light Source (close to Stanford)
3 km accelerator

1. 50 fs X-ray pulse
2. Hits 100 nm particle
3. Particle explodes
4. Short flash, image shows photons interacting before explosion
Cleaning the image up

- Image is noisy diffraction photons
- Missing pixels: experiment geometry and saturation hide some data
- Diffraction image is the Fourier transform => missing signal/noise somewhere affects imaged object everywhere
- Problem of “compressed sensing”
- Challenging to solve fast and with numerical stability
- **Project goal to re-implement parts of Matlab toolbox TFOCS into an efficient GPU-based code (possibly using a GPU matrix library in Python)**
- Other related topics available as well…
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