

Simple Particle Tracking with Matlab

The two main methods

Positional error

$$\langle x \rangle = \frac{\sum_x x I_y(x)}{\sum_{x,y} I(x,y)} \quad I_y(x) = \sum_y I(x,y)$$

$$\text{Error is } \sim \sqrt{N_{\text{pixels}}}$$

Do better by Gaussian fitting. Then position error is

$$\sim \sqrt{N_{\text{photons}}}$$

Correlation

$$G(\xi, \psi) = \frac{\langle K \delta I(x + \xi, y + \psi) \rangle}{\langle I \rangle^2}$$

All we need to do is to follow the maximum for all frames.
Can also look at particle-particle interactions if we perform cross correlation. (K is a kernel image)