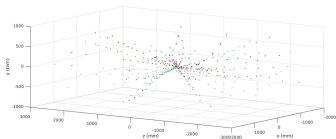
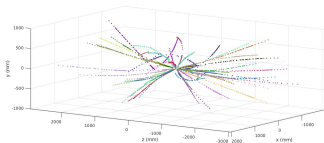


Manifold reconstruction using linear approximations

Panchali Nag, Dept. of Mathematics, Duke University
Connecting the Dots 2020



Particle trajectories from the TrackML dataset assuming track finding has been performed, different colors indicate different particles



The same particle trajectories reconstructed from linear fit

Idea

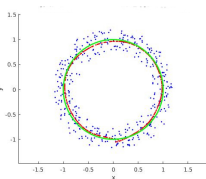
For certain collection of points \mathbf{a}_i surrounding the point cloud, the image under the map

$$\mathbf{r} \mapsto \left(f(|\mathbf{r} - \mathbf{a}_1|)^2, \dots, f(|\mathbf{r} - \mathbf{a}_\Gamma|)^2 \right)$$

can have low curvature. We apply the linear approximation in this space.

Can find applications in fitting, denoising and other regression problems

Denosing with linear polynomial version of Manifold Moving Least Squares



Helix denoising, top view