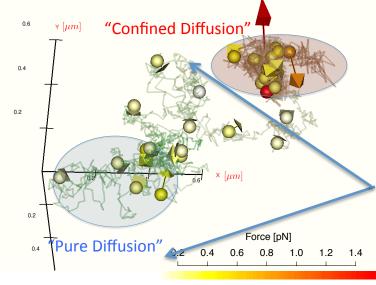


## Quantifying Transient 3D Dynamical Phenomena of Single mRNA Particles in Live Yeast Cell Measurements

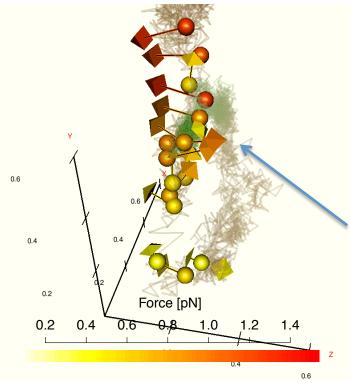


Calderon, Thompson, Casolari, Paffenroth, Moerner. J. Phys. Chem. B, published online September 9, 2013.

1) New 3D DH-PSF technology permits force vector estimation from x,y,z time series measurements via likelihood-based stochastic differential equation (SDE) techniques.



2) SDE techniques enable new ways to quantitatively characterize transitions between modes of motion in a single trajectory.



3) It is possible to check model assumptions against measurements via goodness-of-fit-testing. Procedure identified interesting 3D trajectories. The estimated 3D force vectors on the left suggested "tethering forces" (illustrated via cartoon) associated with molecular motor transport.

(arrows points out of plane) F(r) = A + Br"Tangential"
Force

"Tethering" Force