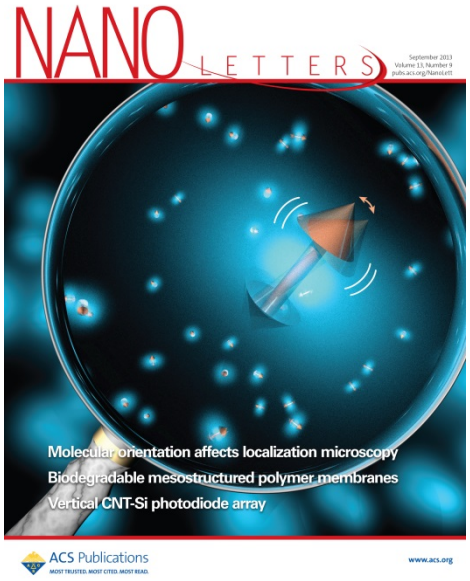
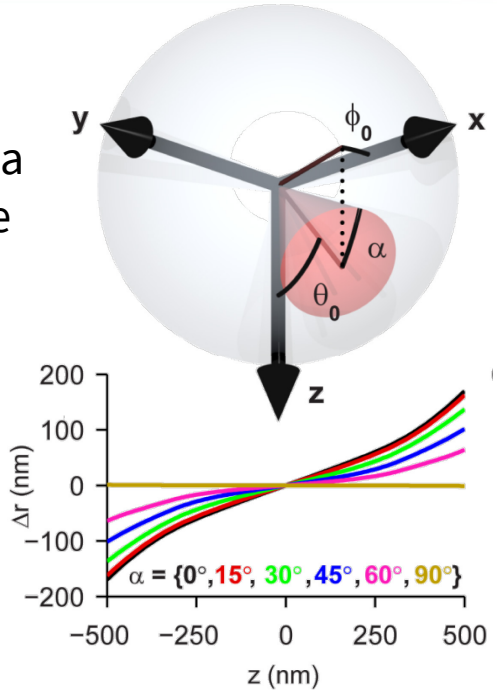
Rotational Mobility of Single Molecules Affects Localization Accuracy in Super-Resolution Fluorescence Microscopy

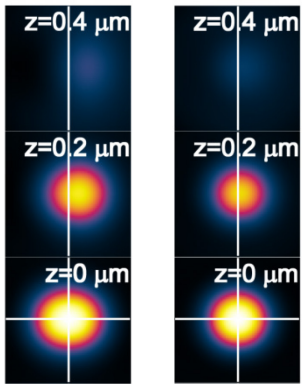
Moerner Lab



The **apparent position** of single molecules changes depending on the **degree of rotational confinement**, parameterized by a cone half-angle α, even though the molecule isn't truly moving in *x* or *y*.

These **localization errors can be as large as ~170 nm**, compared to ~10-20 nm localization precision for single molecule-based super-resolution microscopy. **Mislocalization errors be bounded to ≤10 nm only for cone angles α>60°.**

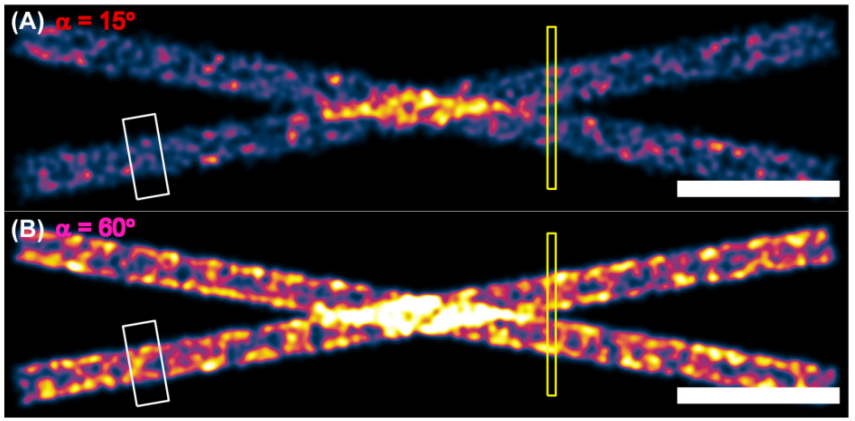




α=15°

α=60°

Simulations demonstrate how low or high rotational mobility can cause **resolution degradation** or **distortion** in super-resolution reconstructions.



Lew, M. D.*, Backlund, M. P.* & Moerner, W. E. *Nano Lett.* **13**, 3967–72 (2013).