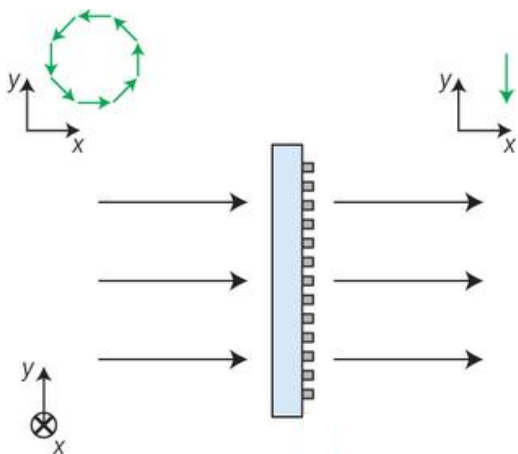


Removing orientation-induced localization biases in single-molecule microscopy using a broadband metasurface mask

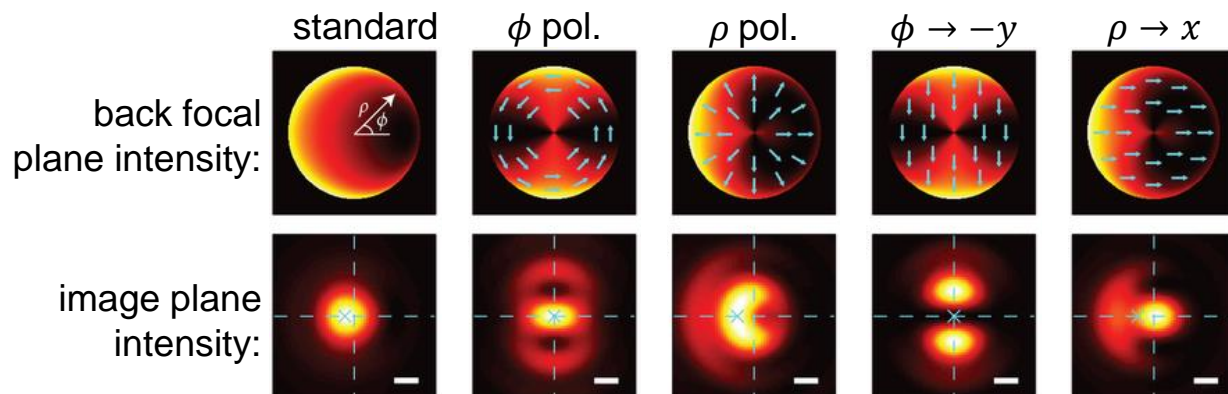
Dipole emission patterns of single molecules can bias their apparent lateral position by >100 nm. The bias is due to the asymmetry of the radially (ρ) polarized emission in the back focal plane.

Concept:

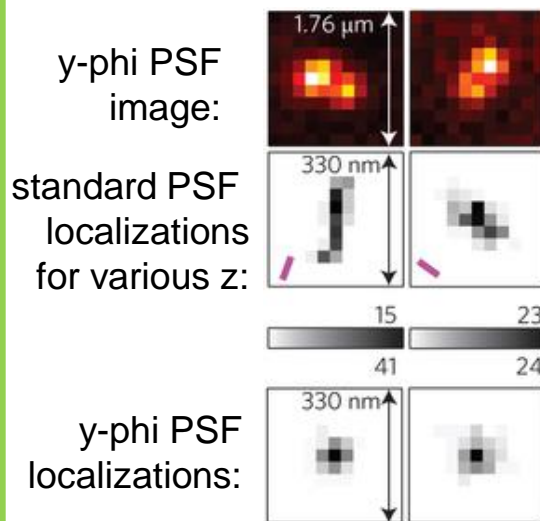
A metasurface “y-phi” mask locally rotates polarization in the back focal plane such that $\rho \rightarrow x$ and $\phi \rightarrow -y$.



The azimuthally (ϕ) polarized emission is then selected with a linear polarizer, producing the unbiased “y-phi PSF.”



DCDHF-A-6 dye molecules:



Malachite green-dL5 proteins: w is the lateral localization error

