

Seeing "more" with unmatched clarity

Macroscopic Super-Resolution imaging

Illumination

Detector  
 Focal plane array  
 Single pixel

Passive illumination

Interferometric pupil synthesis  
 Super-oscillatory PSF engineering  
 Exploit diversity in PSF to circumvent diffraction (work in progress)

Coherent light

Beam combining  
 Optically engineered beams  
 Diffractive beam shaping  
 • Shaping light distribution in object volume at standoff  
 • Super-oscillatory light spots

Active illumination

Sinusoid

AM receiver Structured Illumination Microscopy  
 PSF engineering / Incoherent spatial filtering  
 Sparse aperture synthesis  
 Pupil replication  
 • Shaping structure and transverse extent of PSF  
 Phase modulation  
 Ranging / Depth from Structured Light  
 Phase Measurement Profilometry

Orthonormal basis

Sparsity  
 Compressed sensing

Stochastic codes

Spread spectrum modulation  
 Correlation receiver / Matched filter

Single light spot / Lattice of spots

Sparsify extended object  
 Correlation receiver / Spatial aggregation

Scanning Confocal Microscopy

• Isotropic resolving power  
 • Immune to imager aberrations  
 • Invariant to spatial structure of PSF  
 • Depends on transverse extent of PSF

Non-uniform sampling  
 Foveated imaging

Optics

Diffraction limited  
 Aberrations  
 Stochastic blur  
 Engineered PSF  
 Single lens imager  
 Mitigate speckle when using coherent light (work in progress)  
 • Encode range in PSF  
 • Extend Depth of field