Microscopy Effects on Images

Detectors:

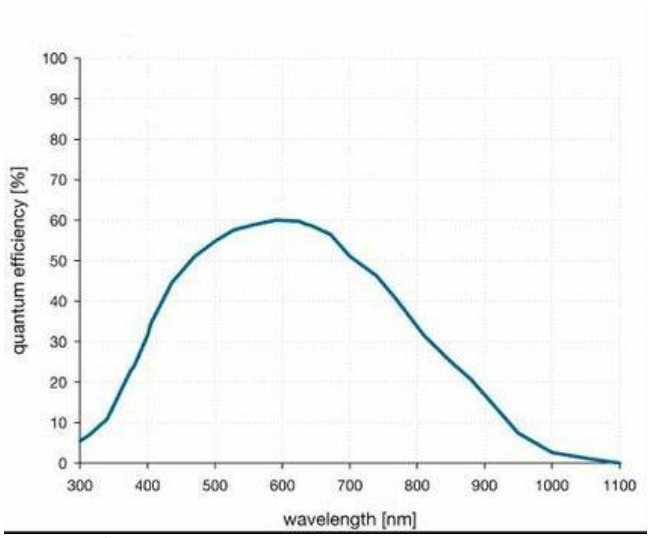
Array Detectors

Cameras, CCD's EMCCD's Back thinned CCD's, CMOS, SCMOS

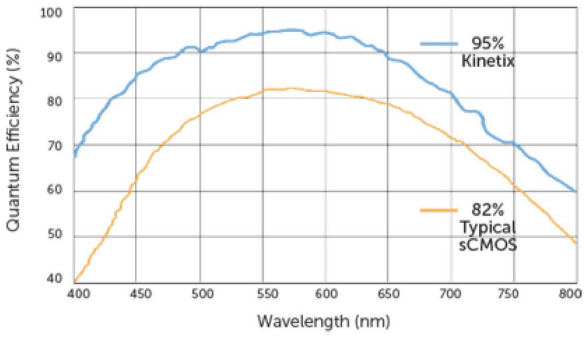
These detectors measure photons and produce electrons in each pixel. The pixels are then readout as a serial list of values representing the photon intensity at each location.

Quantum Efficiency

The quantum efficiency is a ratio between the number of photons hitting a pixel to the number of electrons in the well



PCO edge 5.5 sCOMS



Kinetix sCOMS

IXon CCD

Noise

- **Read Noise:**
- Errors in reading elections in wells. Read noise is independent of ingratiation time and effects low light level imaging.
- **Shot noise:**
- statistical differences in the number of photons hitting the pixel
- **Dark noise:**
- Is the accumulation of electrons when no photons are hitting the pixel
- **Hot Pixels/ Dead Pixels:**
- Pixels with Higher or lower dark noise

Pixel Size

Use magnification and Nyquist theorem

Point Detectors

PMT's APD's

Quantum Efficiency

Noise

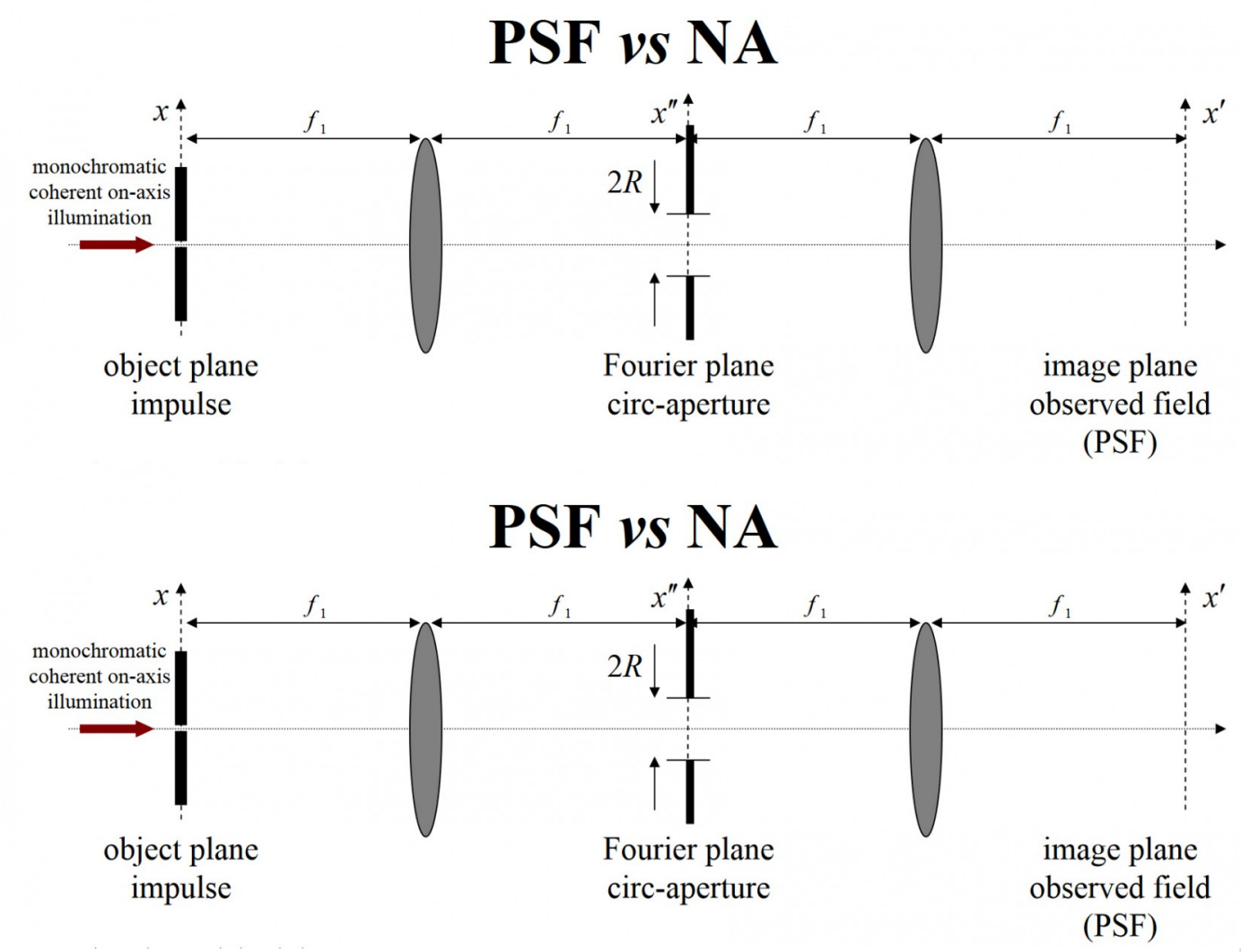
other Info

more stuff

even more stuff

Point Spread Function

A microscope is a 4f system as shown



PSF vs NA
x
f1
f1
x″
f1
f1
x′
monochromatic
coherent on-axis
illumination
2R
object plane
impulse
Fourier plane
circ-aperture
image plane
observed field
(PSF)

The objective is the first lens and col

Objectives

https://www.microscopyu.com/digital-imaging/introduction-to-charge-coupled-devices-ccds

Revision #15
Created 26 November 2024 22:04:33 by Glenn Fried
Updated 2 December 2024 23:13:29 by Glenn Fried