



Slit-Scanning Confocal Florescence Microscope



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Fluorescence microscopy demands efficient light use

- Uses a laser to excite a fluorophore
- Fluorophores release light in a different wavelength
- The return light is separated using a dichroic

Confocal Microscopy

- A pinhole is used to filter out light that is not in the plane of focus
- Scanning confocal microscopy takes this concept and moves the excitation beam over the sample
- Creates an image of the immediate plane of focus

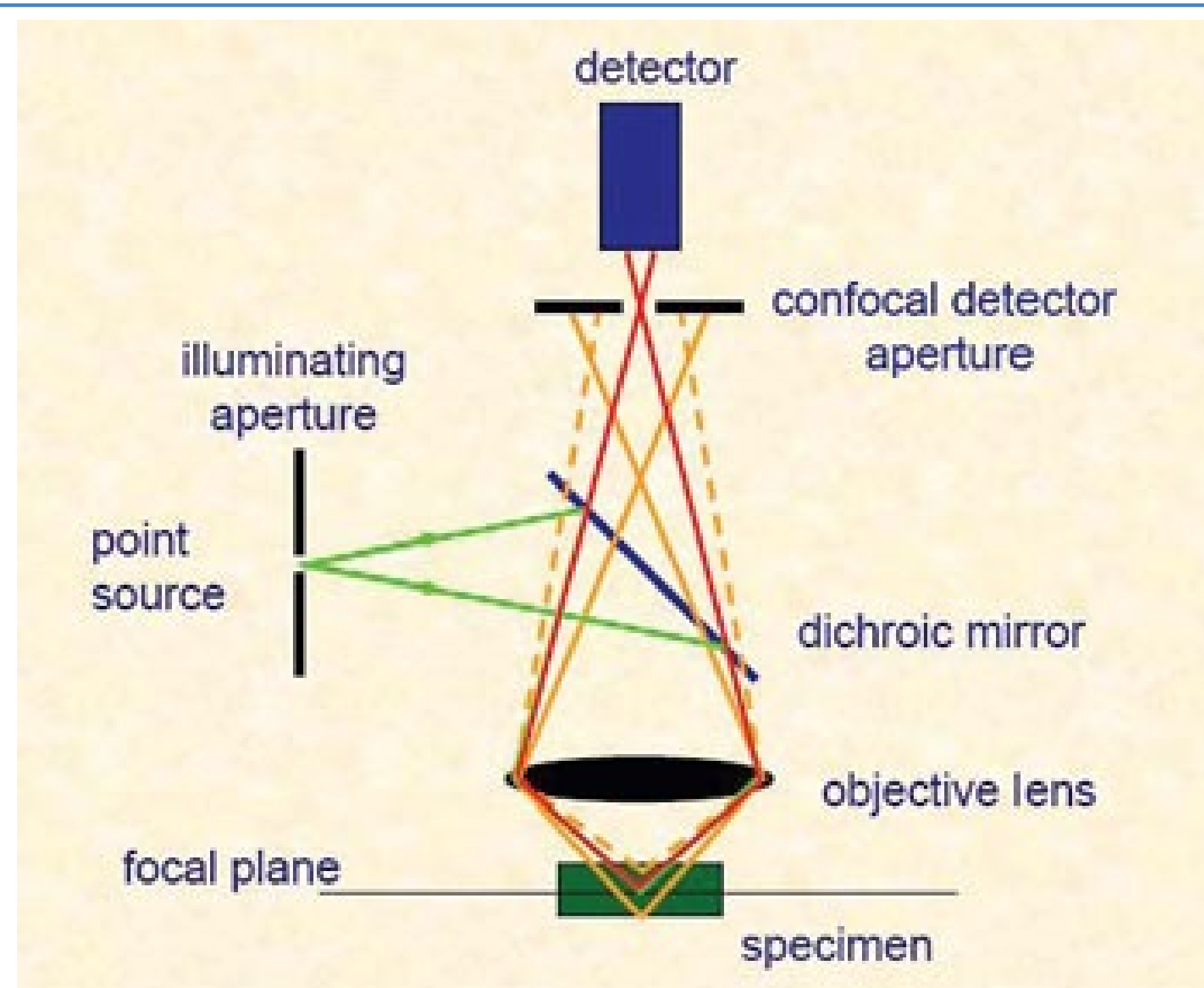


Figure 1: Confocal Microscope Diagram^[1]

Acknowledgements

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References

1. Confocal microscopy. Microscopist.co.uk. (n.d.). Retrieved February 12, 2023, from <http://www.microscopist.co.uk/essential-techniques/confocal-microscopy/>

Novel scheme replaces high cost and less efficient optical components

- Replace expensive and high loss scan lens
- Spin mirrors were used to mimic the scan lens and displace the beam along the sample
- Pinhole replaced by slit for faster scanning of the sample

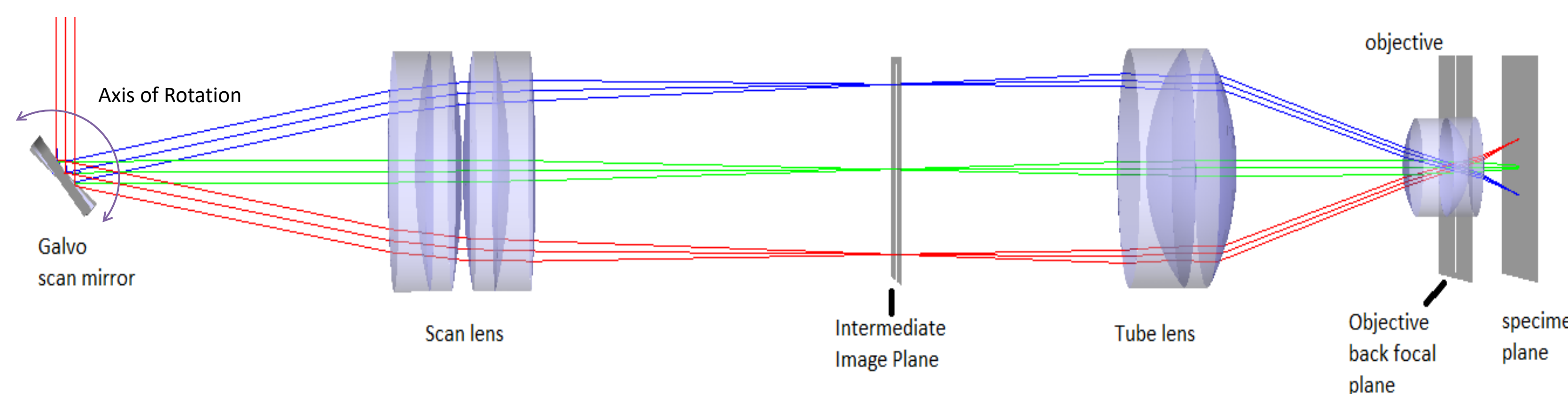


Figure 2: Scan Lens Diagram

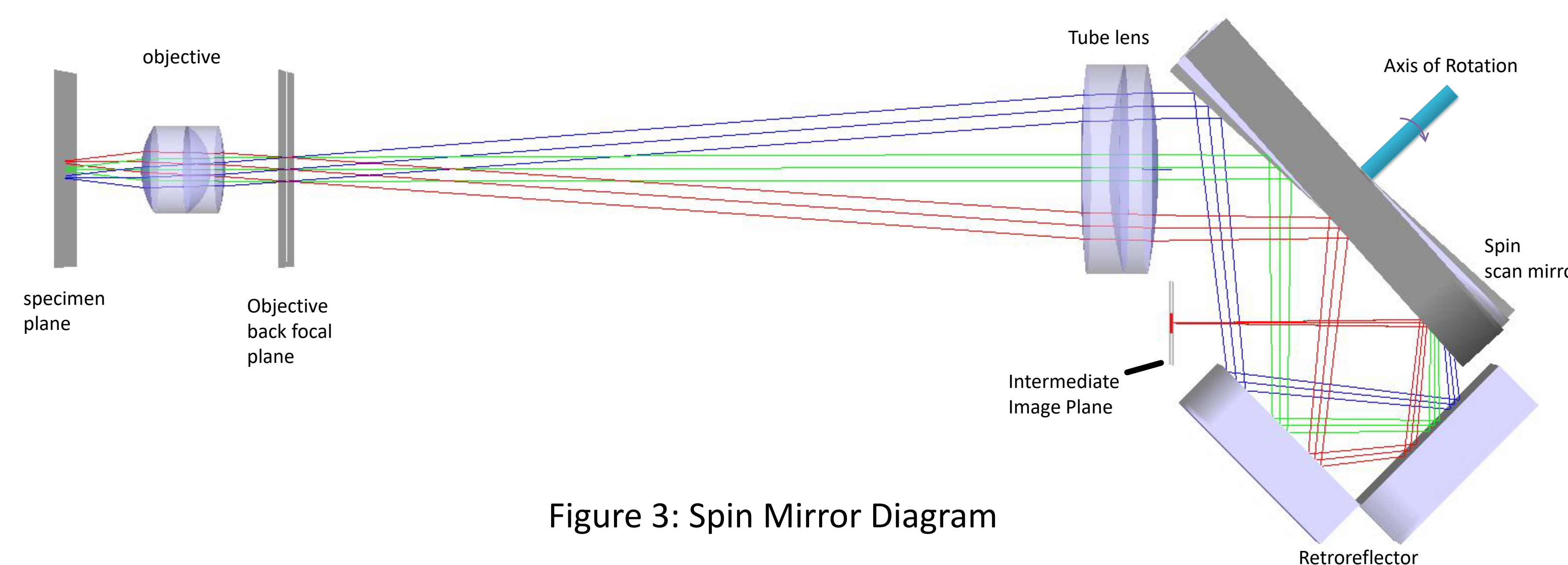
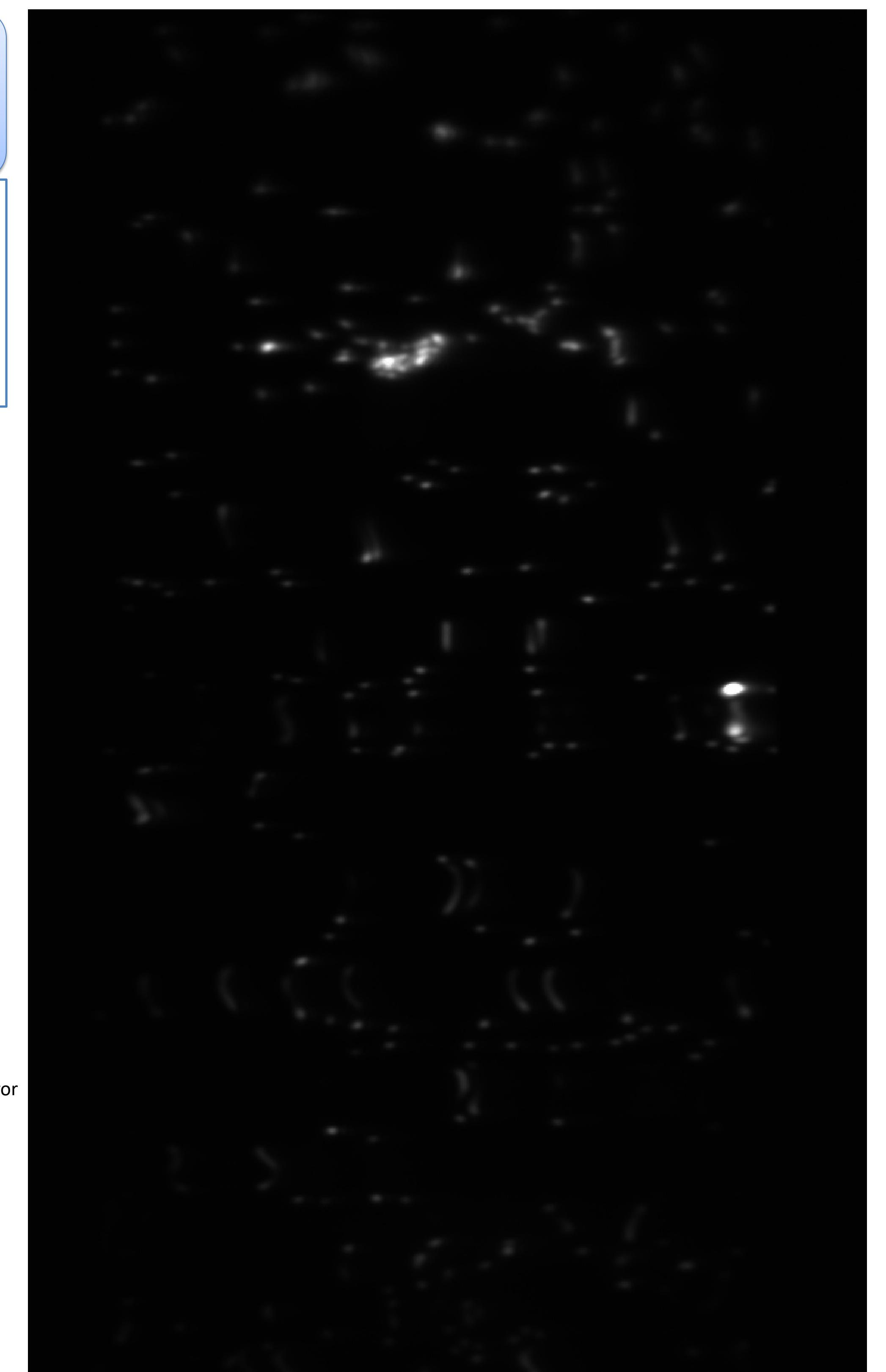


Figure 3: Spin Mirror Diagram

Results

- Full 2D image was obtained in a single pass of the laser
- Beads, 100 nm in size, can be seen in figure X
- The apparent size of the beads average about $0.36 \pm 0.04 \mu\text{m}$ in width and $0.31 \pm 0.08 \mu\text{m}$ in height (diffraction limited)

Figure 4: Scan of 100 nm Bead Sample



Future Development

- Alter spin mirror mounts to provide more stability and a tunable tilt
- Obtain higher quality scans
- Create 3D image stacks