

Az El Mount Exposure Time

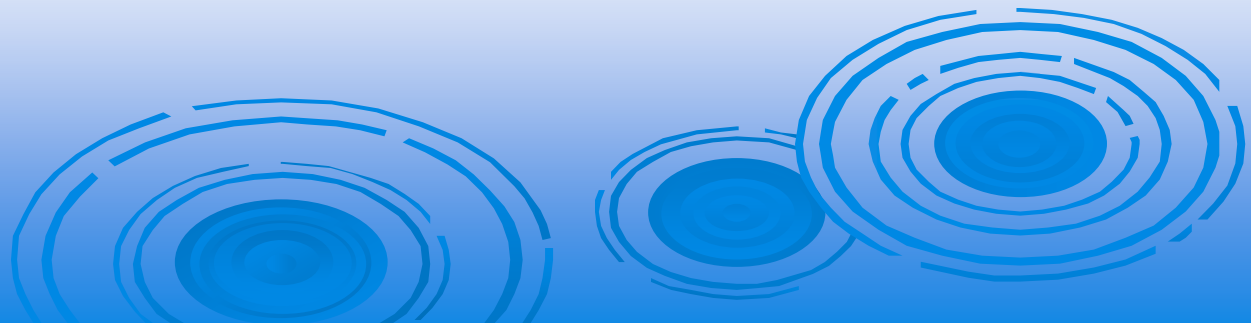
Shef Robotham

Litchfield Hills Amateur Astronomy
Club



Azimuth/Elevation Mount Exposure Time

- Interested in Astro Imaging with AzEI mount
 - Quick and Easy Set-up !
 - No Polar Alignment !
- Requires Good AzEI Tracking
 - Mount 'Trained'
 - AzEI 'PEC'

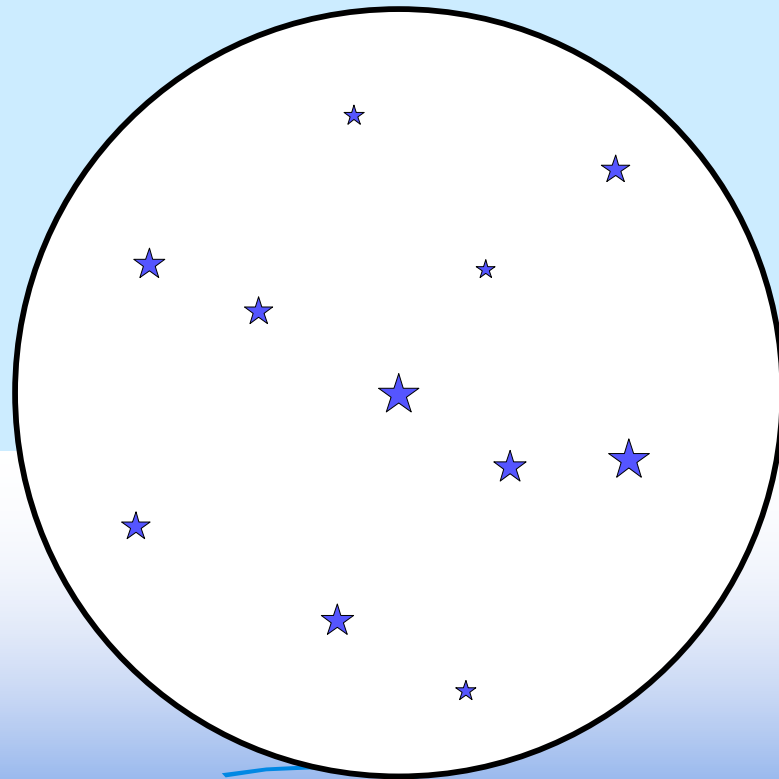


Preliminary Calculations Requirements

- Camera Sensor Dimensions
 - H,W and Pixel Size
- Diffraction Limited Spot Size for Scope Configuration
 - Telecompressor
 - Barlow
- Match Diffraction Limited Spot Size to CCD Pixel Size
 - Degree of Binning



Simulated Eyepiece View

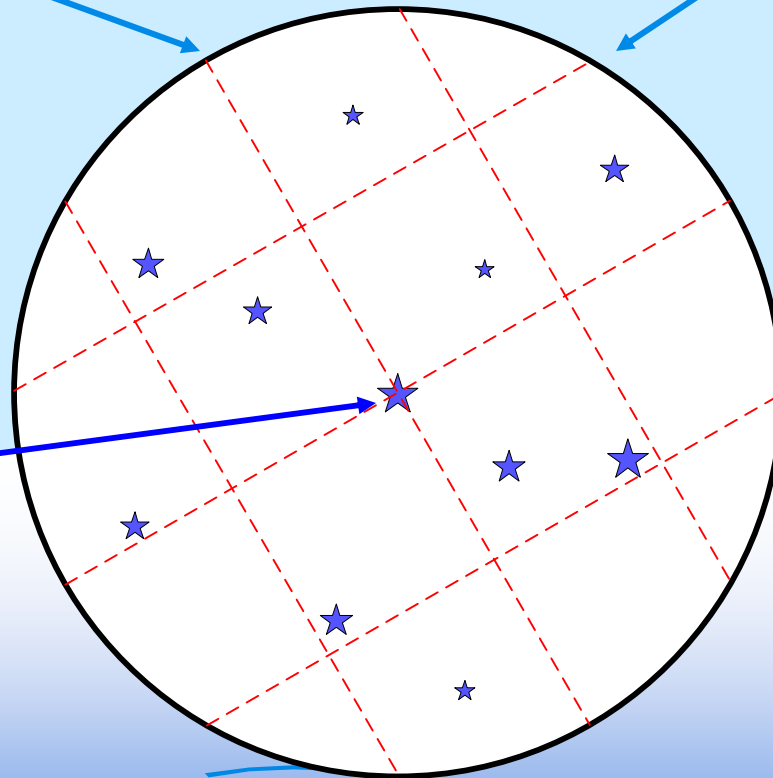


RA/Dec Eyepiece View

Lines of Right Ascension

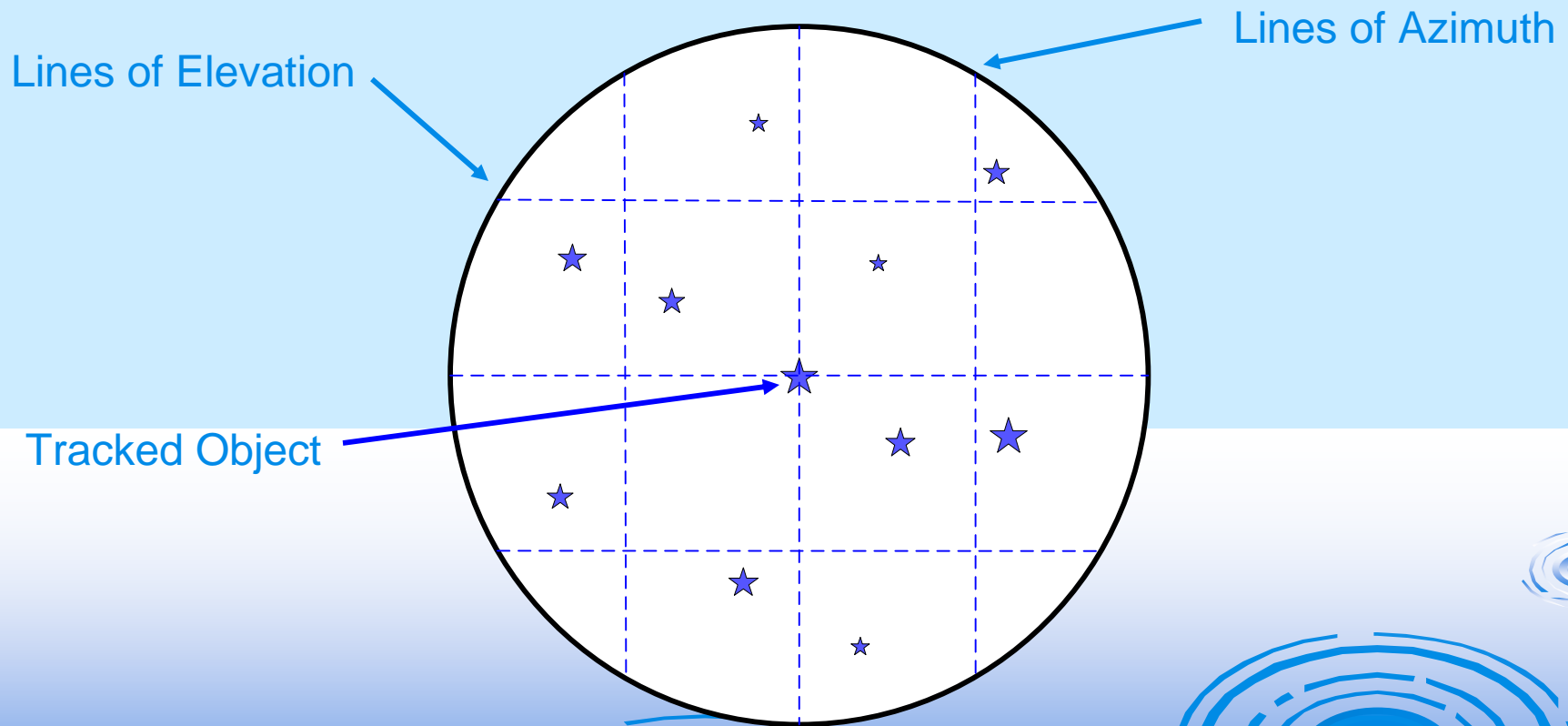
Lines of Declination

Tracked Object



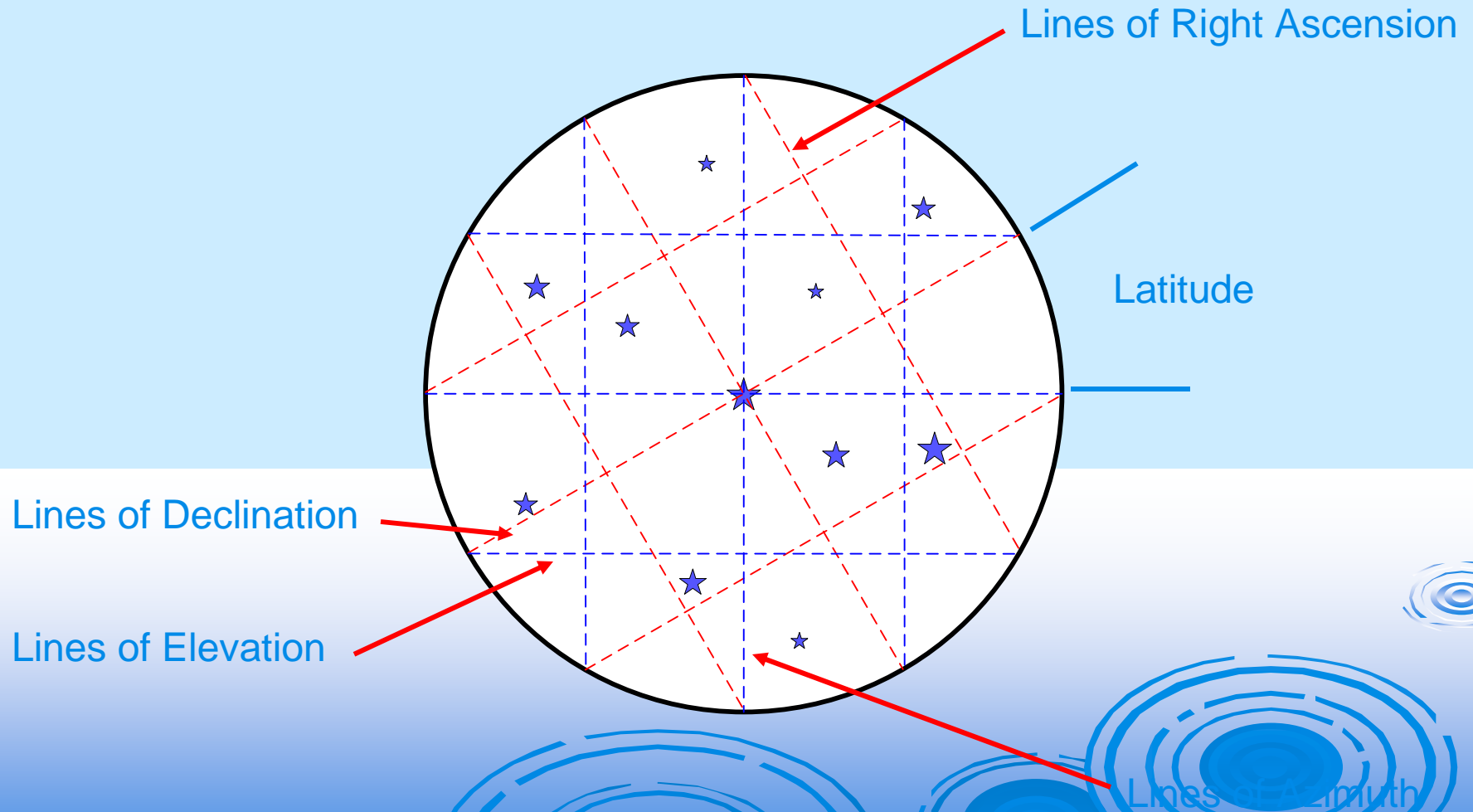
Object 'tracked' using RA Only

Az/EI Eyepiece View

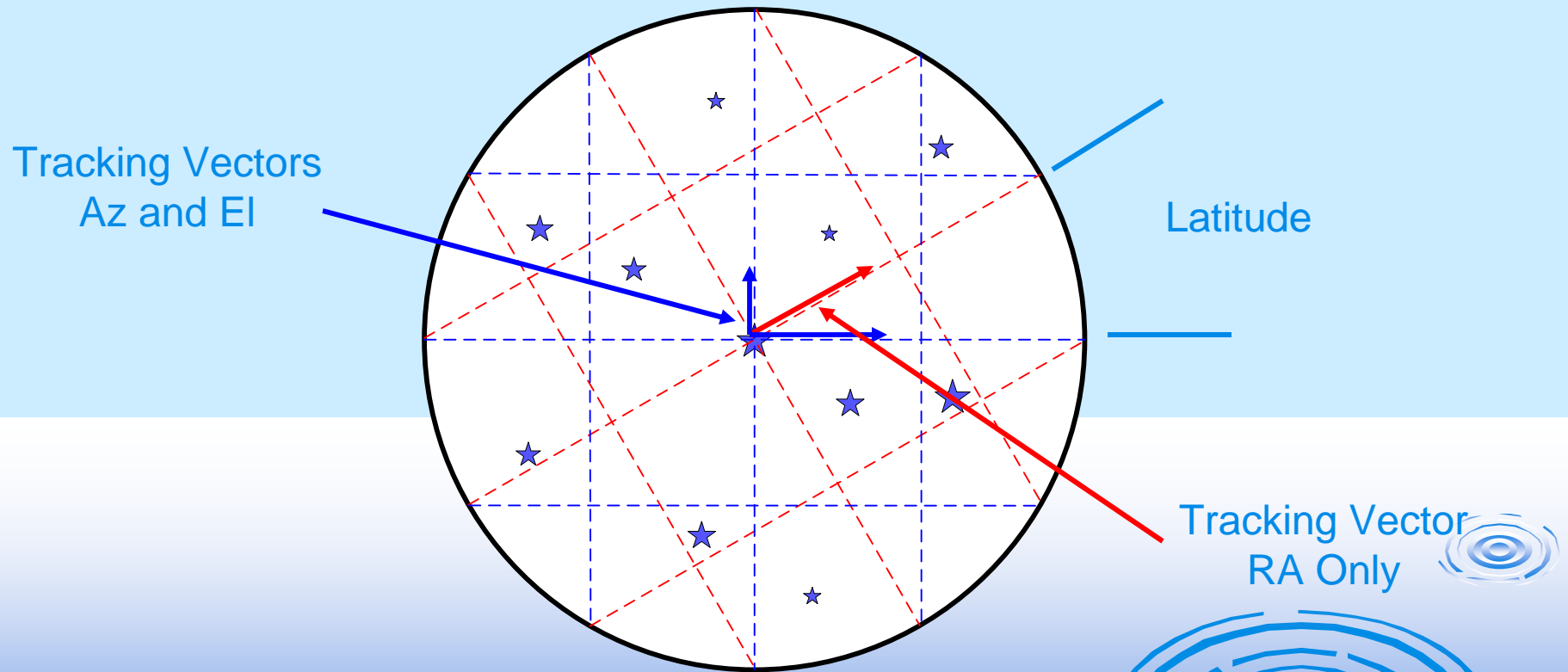


Object 'Tracked' with both Azimuth and Elevation Simultaneously

Ra/Dec and Az/EI Reticle



Tracking Vectors



Specific Field of View

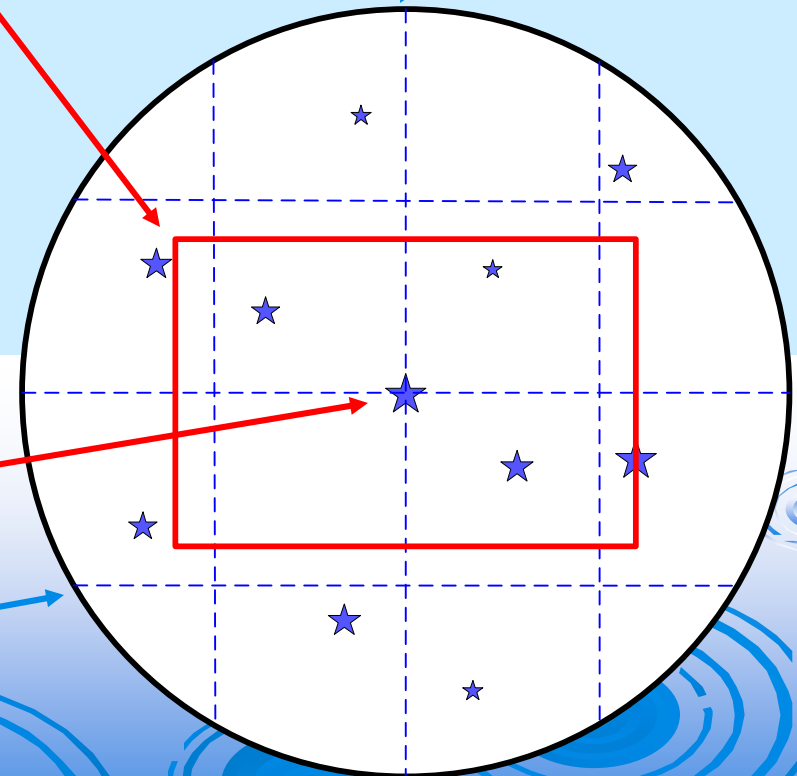


Camera FOV

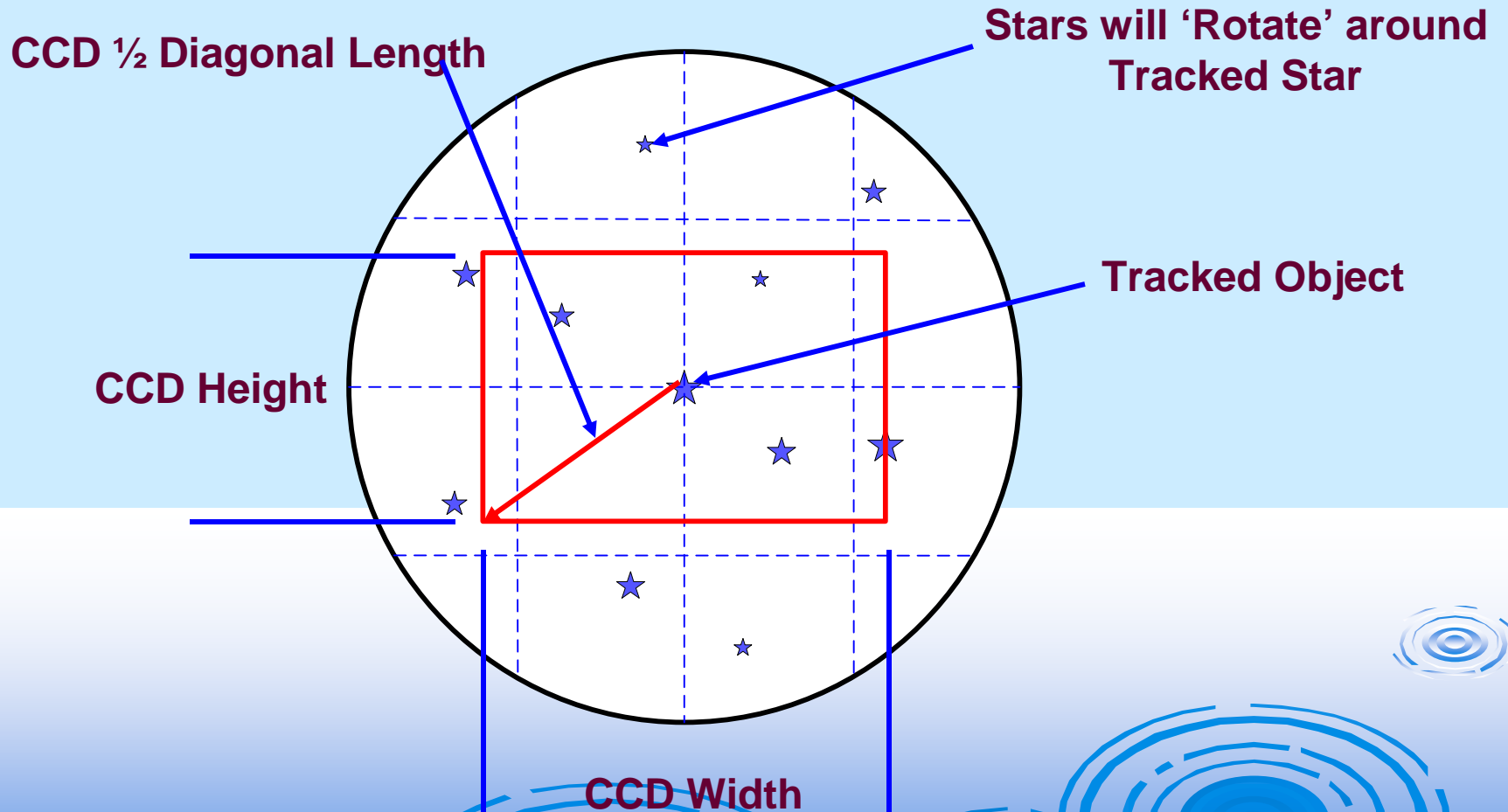
Azimuth Lines

Tracked Object

Elevation Lines



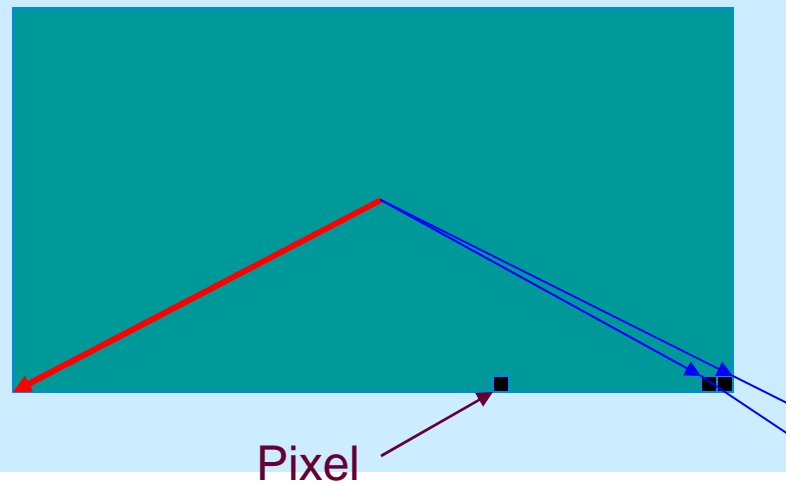
Field of View Dynamics



$$CCD \text{ Diagonal} = \frac{[(H^2 + W^2)^{.5}] \cdot 2}{2}$$

CCD Sensor Array

Peripheral Stars Rotate $360^\circ/24$ Hours or
15 arc sec/sec.



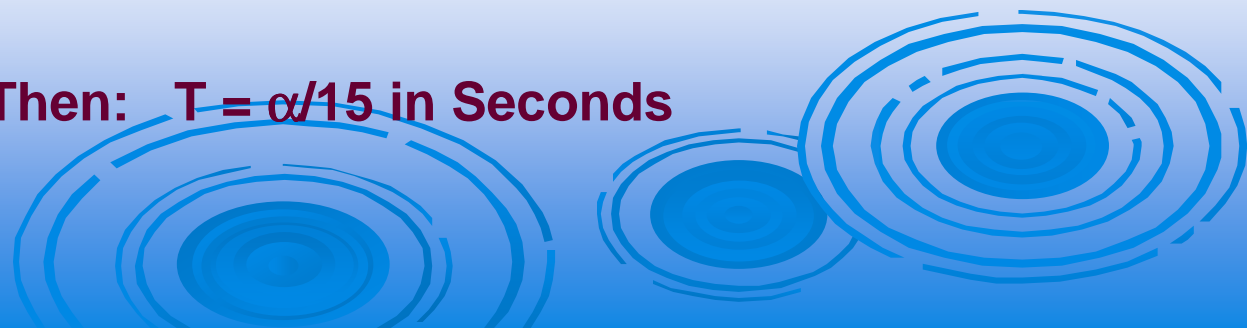
Angle Formed by 2 Adjacent
Pixels and Sensor Diagonal

"Pixel Size" includes Binning

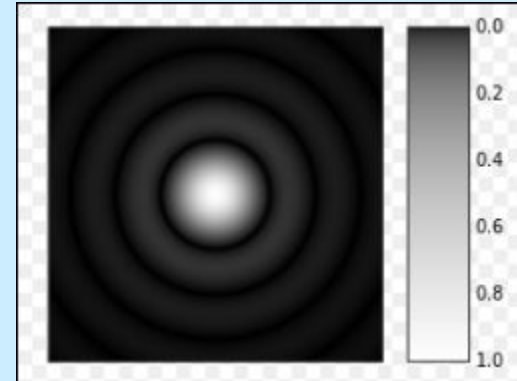
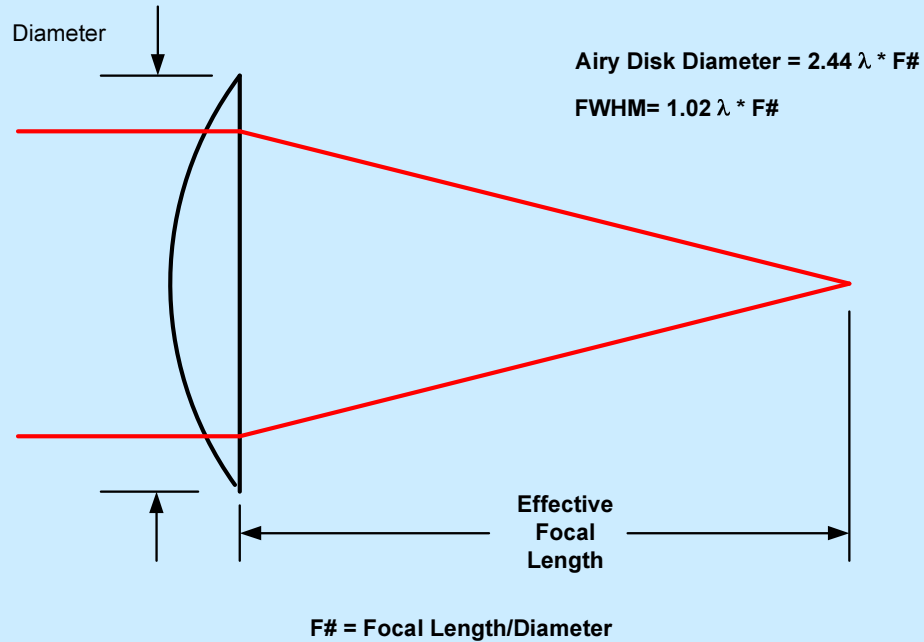
Using the Sensor
Diagonal, instead will
result in NO Star Trails.

$$\alpha = 3600 * \arcsin((2 * \text{Pixel Size}) / \text{Array Diagonal})$$

Then: $T = \alpha / 15$ in Seconds



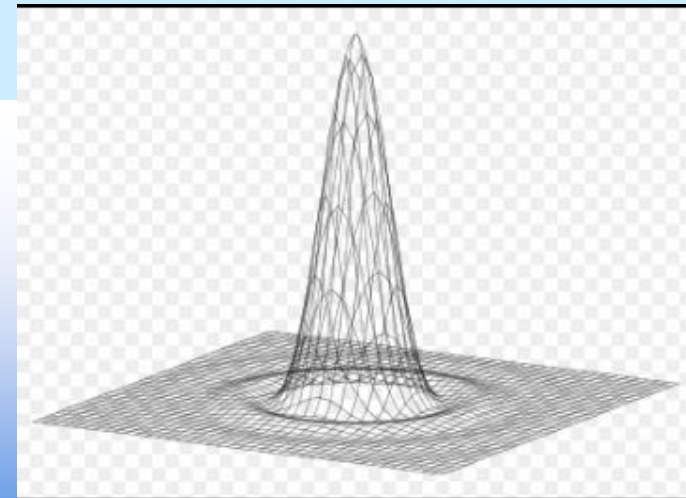
Diffraction Spot Size



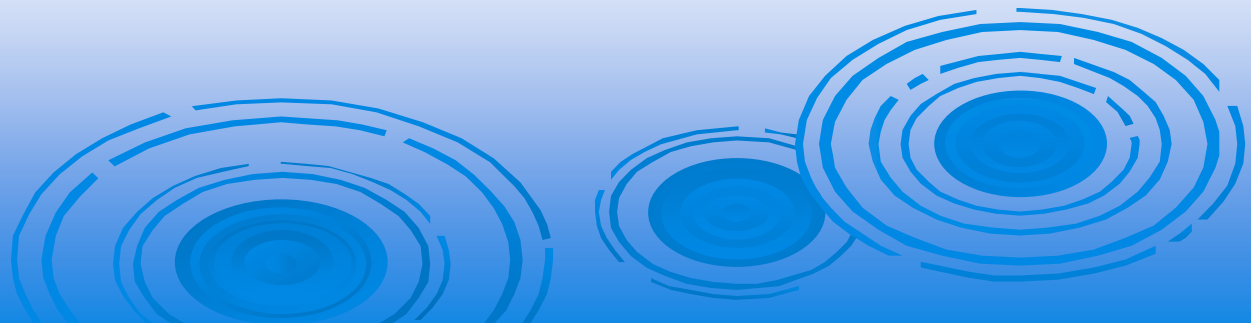
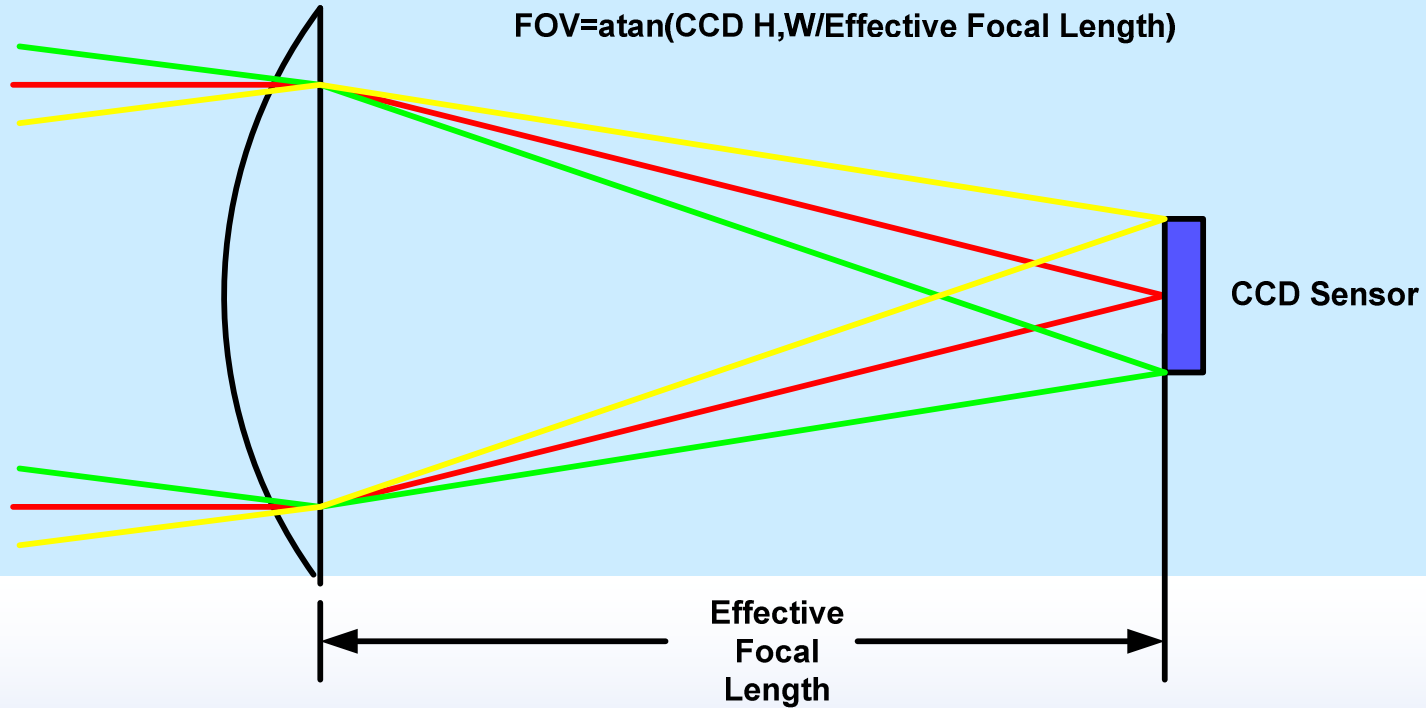
Focal Length is EFFECTIVE Focal Length

$$FW = 2.44 \lambda F_{\text{effective}}$$

Pixel Size should Match Full Width Diffraction Limited Spot Size



Field of View



Summary

- **Adjust Effective F# of Scope for Desired Field of View**
- **Match diffraction spot size to pixel size including Sensor Binning**
 - Increase Binning will increase maximum time
- **Calculate the CCD Sensor 'Pixel Angle', arc seconds**
 - Angle formed by Pixel Spacing at peripheral of Sensor
- **Exposure Time = Pixel Angle/15, Seconds**

