

Optical Remote Sensing - Passive

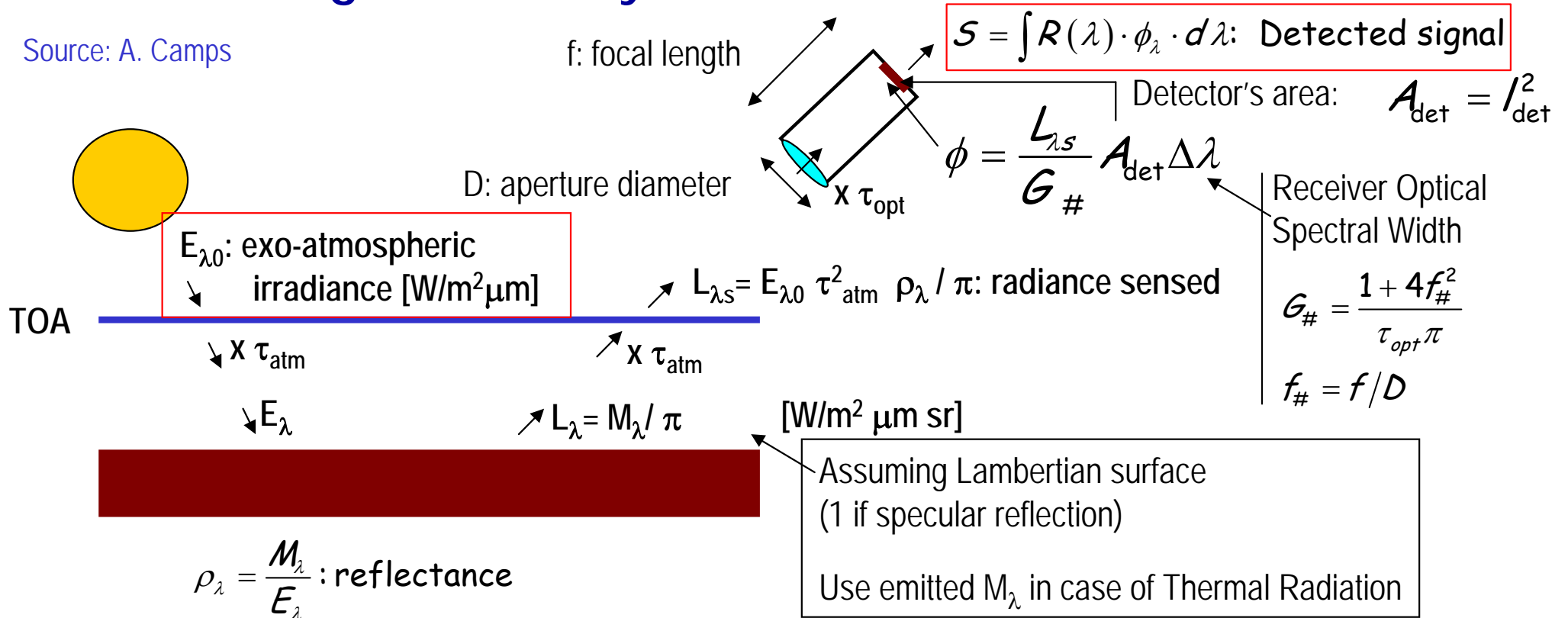
Chap. 6 Detector-Sensor Performance (II): Link Budget

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6.1 Link-budget summary

Source: A. Camps



POWER [W] ON DETECTOR:

$$\phi = \frac{L_{\lambda s}}{G_{\#}} A_{det} \Delta \lambda = \frac{E_{\lambda 0} \cdot \tau_{atm}^2 \cdot \rho_{\lambda}}{\pi G_{\#}} \cdot A_{det} \cdot \Delta \lambda$$

RADIOMETRIC RESOLUTION:

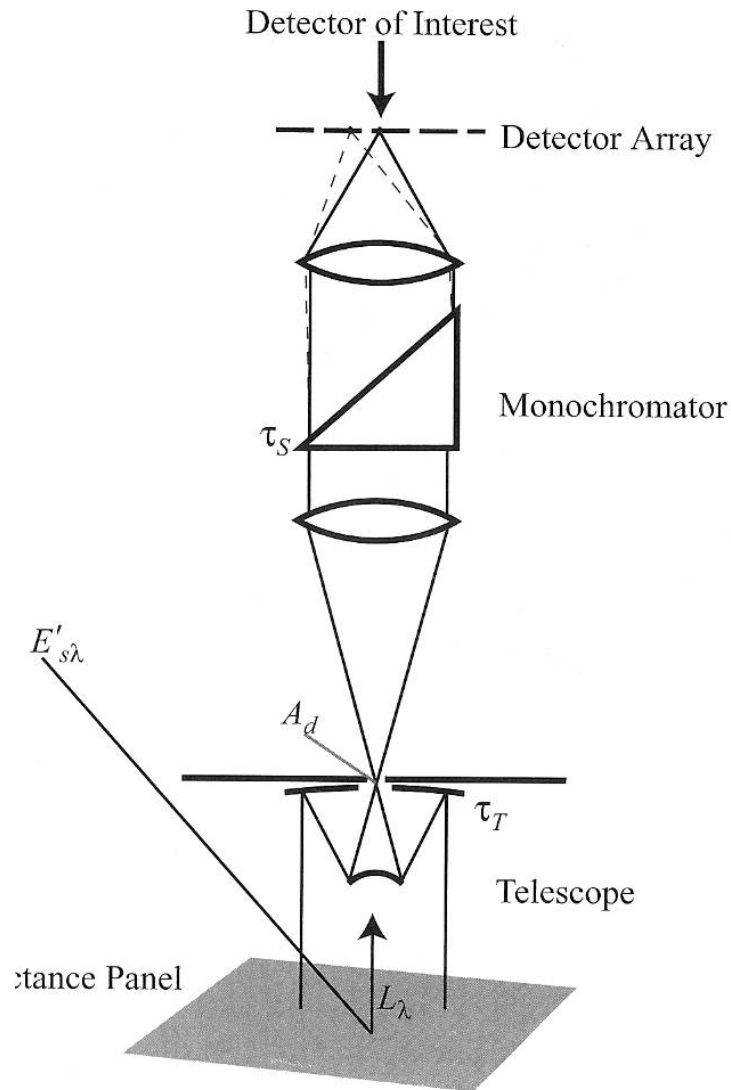
$$\rho \pm \Delta \rho \xrightarrow{\times E_{\lambda} / \pi} L \pm \Delta L \xrightarrow{\times \frac{A_{det} \Delta \lambda \tau_{atm}}{G_{\#}}} \phi \pm \Delta \phi$$

Reflectance Radiance Power

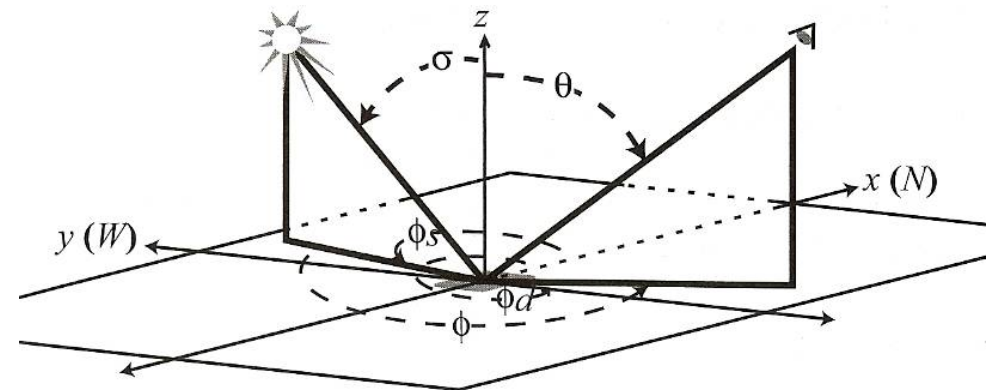
NE $\Delta\rho$ NER NEP

$$NEP(\lambda) = \frac{\sqrt{A_{det} \cdot B}}{D^*(\lambda)}$$

6.1 Prob.1 VIS-band sensor performance case (link budget I)



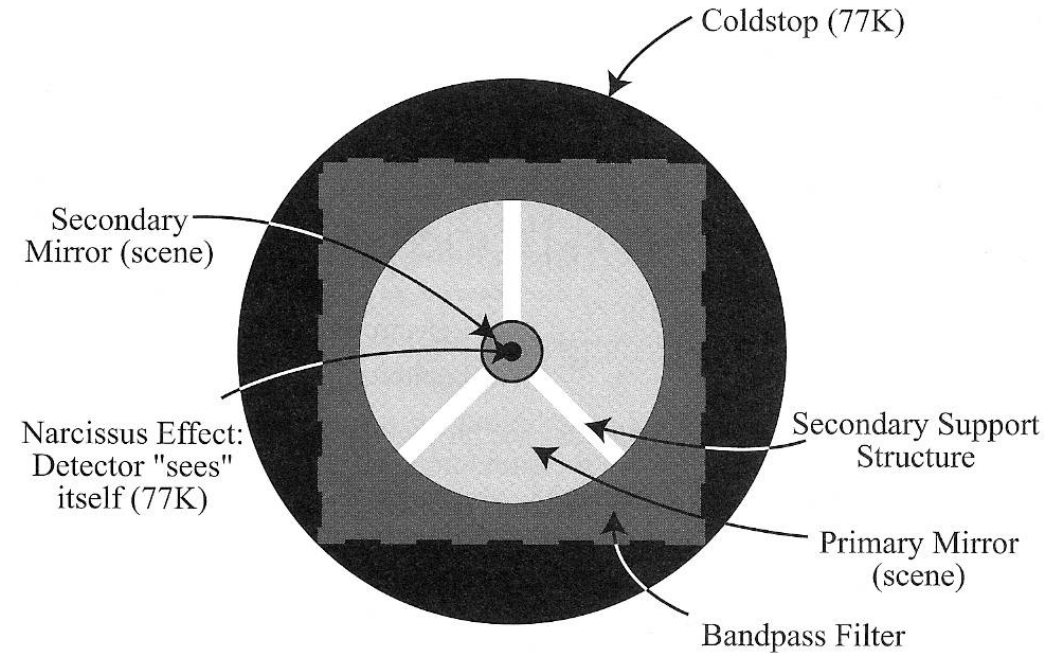
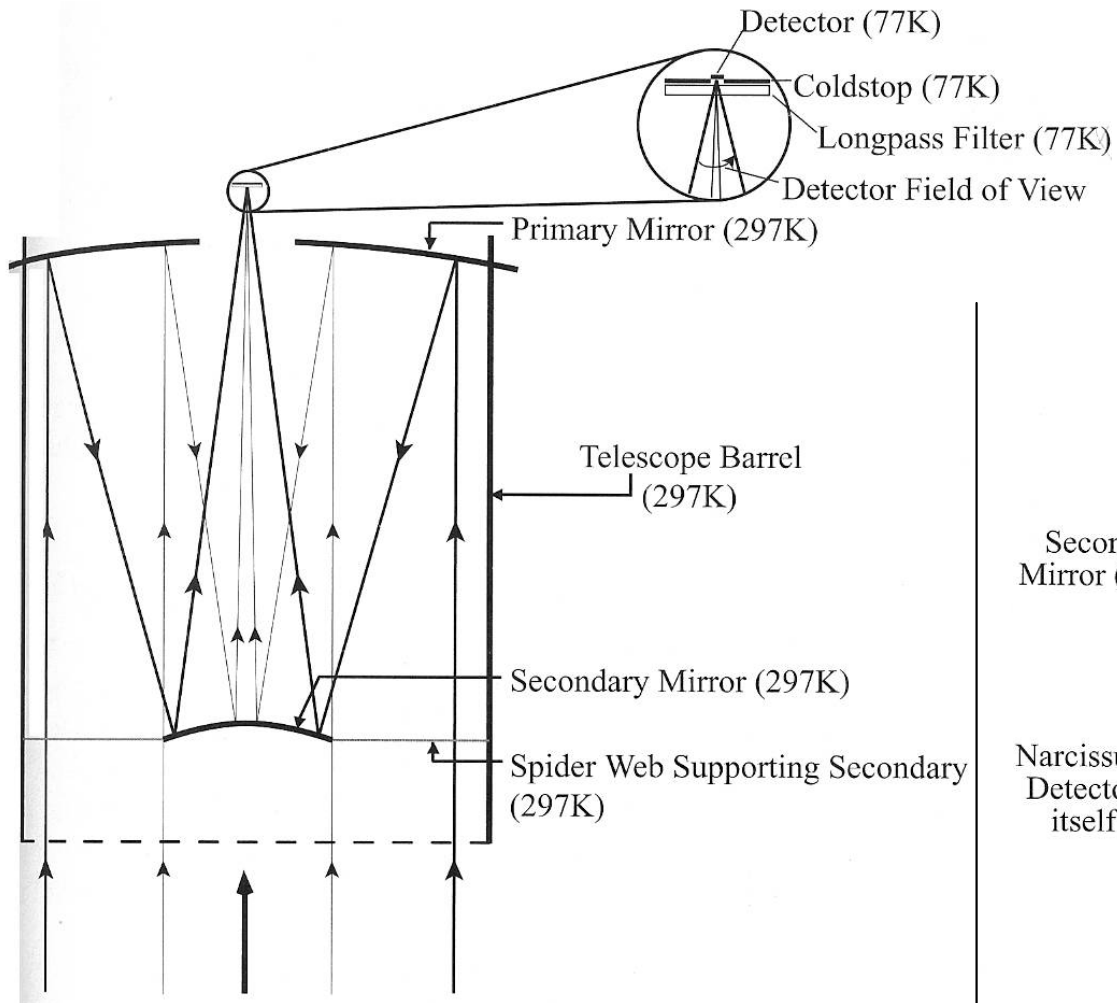
Consider a high-spectral resolution system operating in the visible band that takes advantage of high-performance Si detector array technology. The system is conceptually similar to the AVIRIS and MISI imaging spectrometers but for simplifying reasons only the $0.5 \mu\text{m}$ band is considered here.



[ORSPS_Prob1.pdf](#)



6.2 Prob.2 Thermal IR sensor performance case (link budget II)



ORSPS_Prob2.pdf



ACKNOWLEDGEMENTS

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Hamamatsu Photonics Application Notes:

- “Characteristics and use of Si APD”, SD-28, Hamamatsu AN (2004).
- “Characteristics and use of infrared detectors”, SD12, Hamamatsu AN (2004).
- “Characteristics and use of FFT-CCD area image sensor”, SD-25 Hamamatsu AN (2003)
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- “Photon Counting using Photomultiplier Tubes”, Hamamatsu AN (1998).

UDT sensors, Advanced Photonics

Judson Technologies LLC