超広視野近赤外スペースミッションの検討

Feasibility Study of Very Wide-Field Near-IR Space Mission

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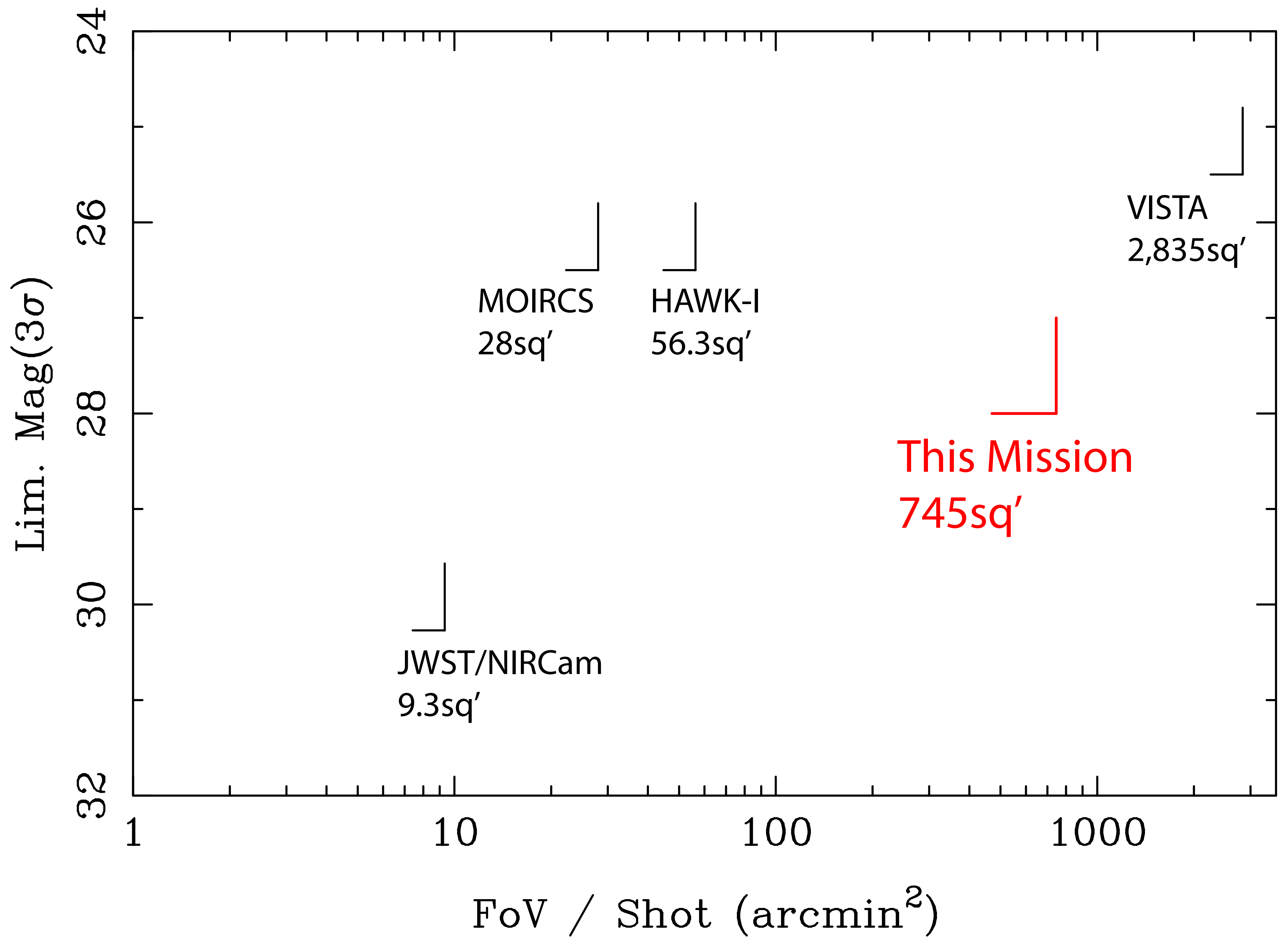
ポスターA24b

Very Wide-Field Near-IR Space Mission

- 1.5m Telescope
- FoV: ~30'ϕ(700 arcmin^2/shot)
- Wavelengths: 1-2.5μm (possibly <5μm)
- Limiting Magnitude: K~28AB
  - Unprecedented Depth (Unreachable from ground)
- Dedicated Mission: Superb Wide Survey Area (~100 sq. degrees)

Very Wide-Field Near-IR Space Mission



Scientific Objectives

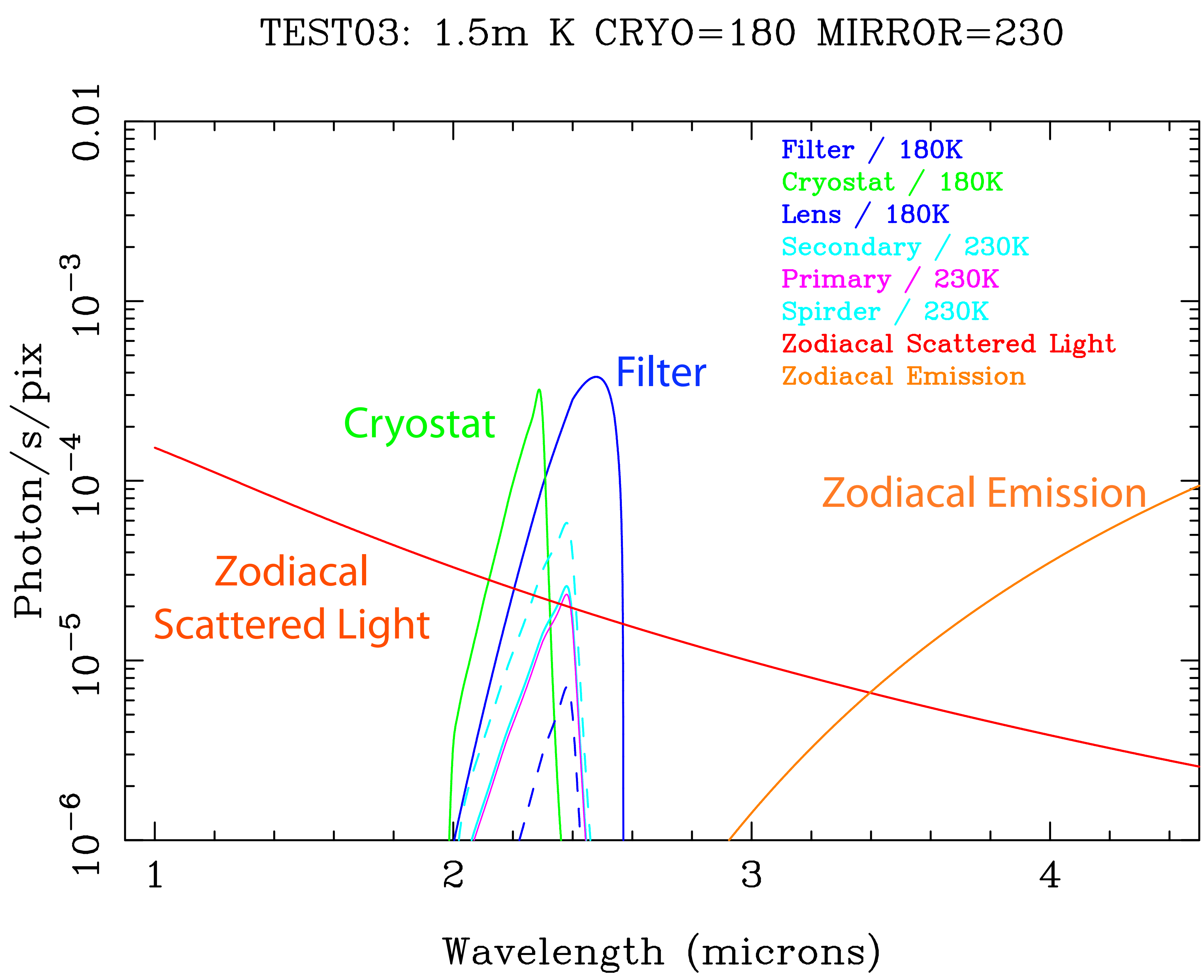
- Direct Extensions from Results of the Subaru Telescope
- Complimentary with Other Future Projects
- Detection of "First Galaxies" (z=7-14)
- Census of the Reionization Epoch
- <u>Unbiased View of Galaxy Assembly at z=1-3</u>
  - Stellar Mass based Large Scale Structures
  - Stellar Mass Function at Very Low-end

Feasibility

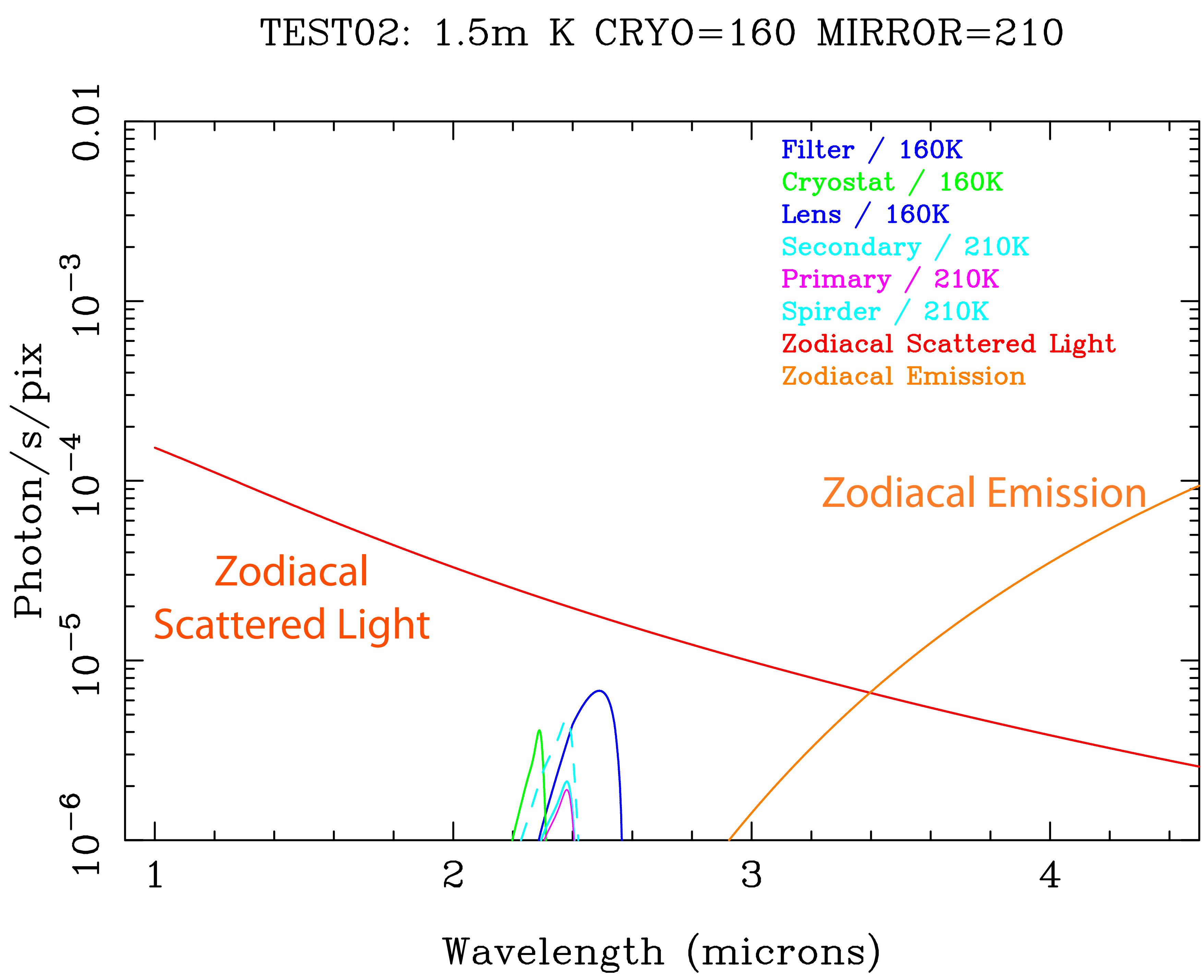
Thermal Emission

- Thermal Emission from Instruments
  - Primary and Secondary Mirrors, including Spider
  - Filter, Three Corrector Lenses
  - Cryostat

K-band Thermal Emission, Cryostat=180K, Mirror=230K



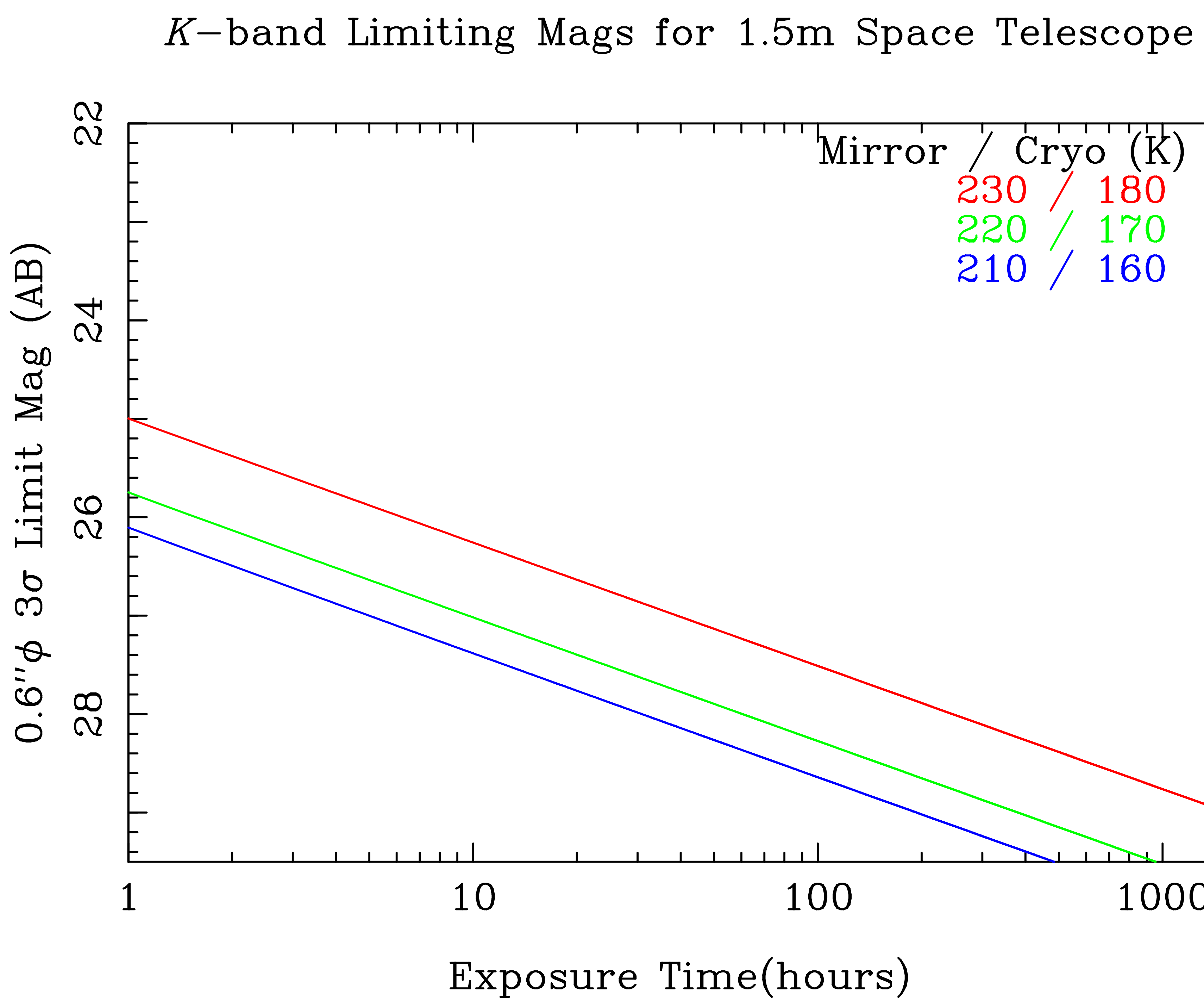
K-band Thermal Emission, Cryostat=160K, Mirror=210K



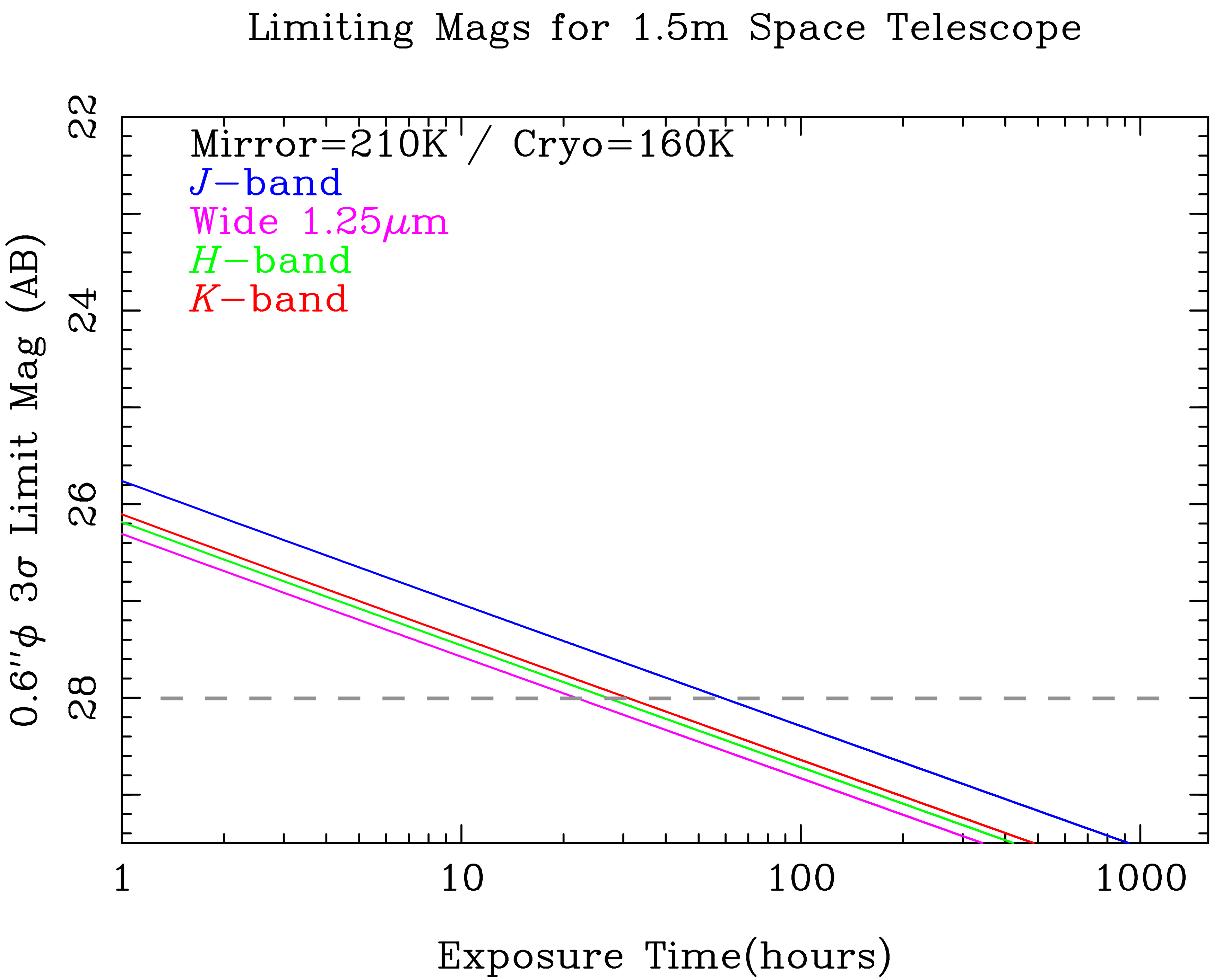
Expected Sensitivity

- Backgrounds
  - Zodiacal Lights (Scatter, Thermal)
  - Thermal Emission from the Telescope and Instruments
- Dark: 0.05e-/sec/pix
- Read-out Noise: 10e-
- System Efficiency: ~30%
- Object: $f\nu$=flat, FWHM=0.5”, Aperture=0.6” (at $\lambda<2.5\mu m$)

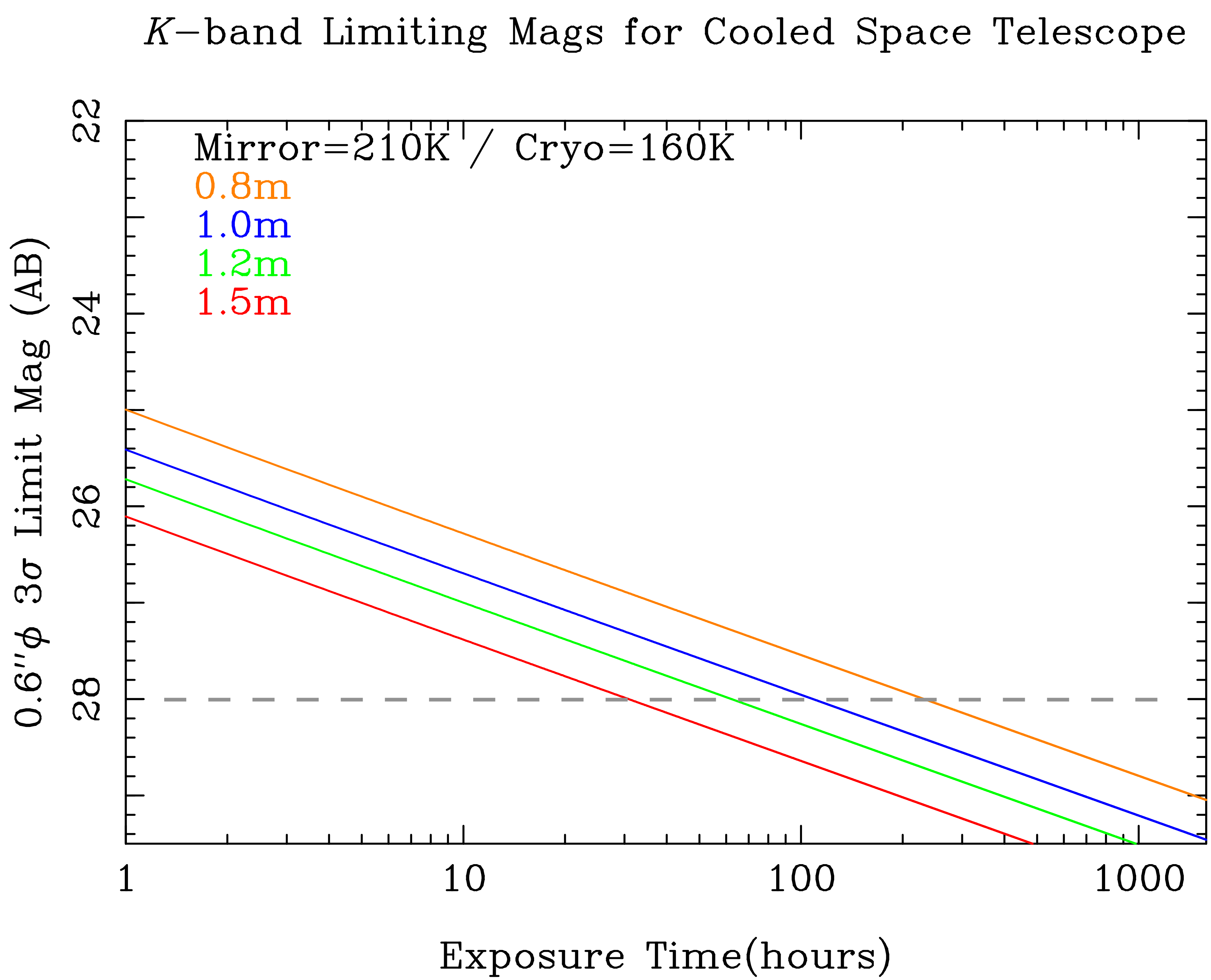
Expected Sensitivity at K-band



Expected Sensitivity with Different Filters



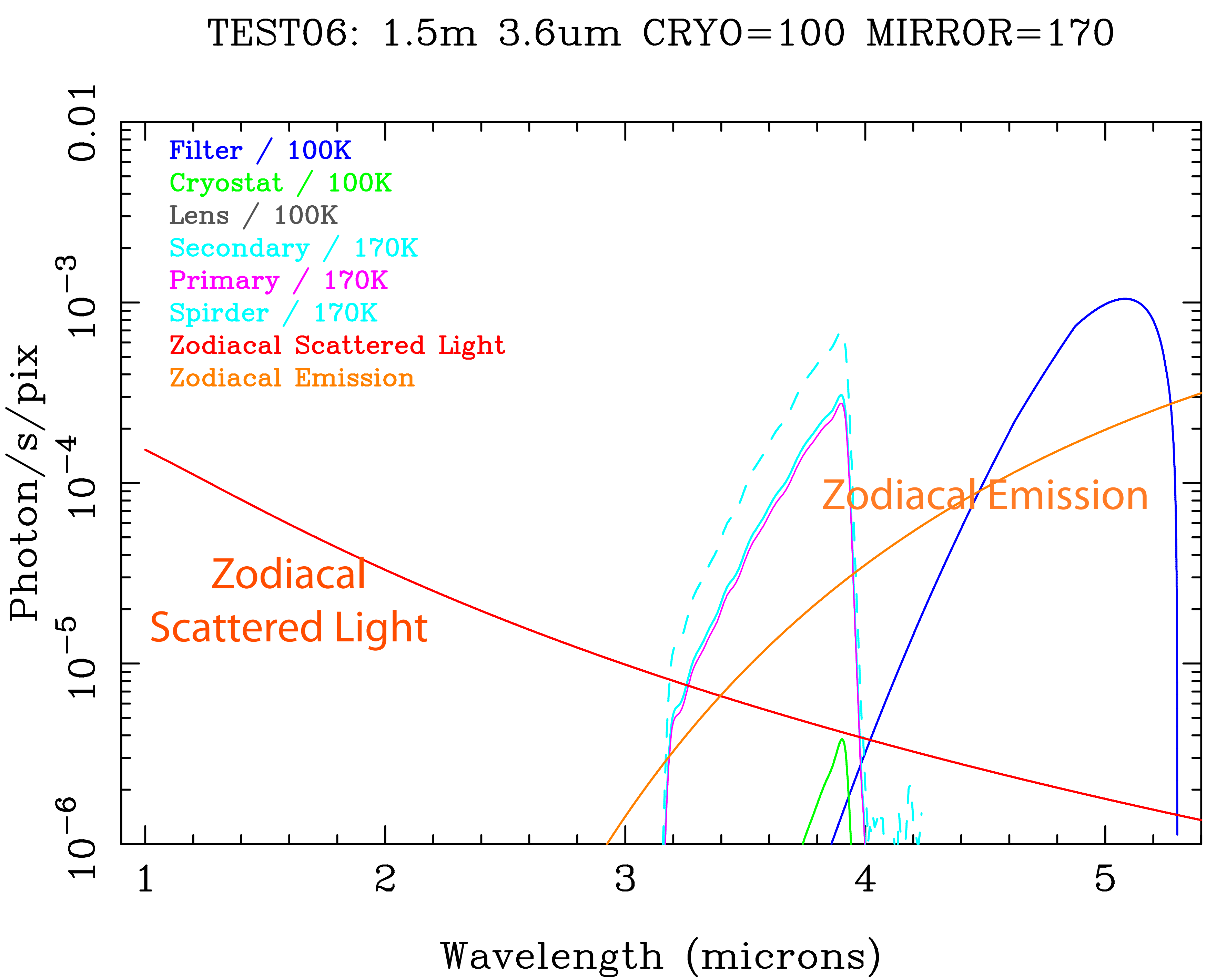
Expected Sensitivity with Different Mirror Sizes



Summary

- With 1.5m Telescope and Instruments at 160K, We will be able to obtain Unprecedented Deep Near-IR Images (~28AB mags) for ~100 sq. degrees.
- Thermal Design will be the Key.
- R&D including Detailed Optical Design are in Progress.
- see Poster A24b for details.

3.6µm Thermal Emission, Cryostat=100K, Mirror=170K



Expected Sensitivity at 3.6-4.5μm