

Astro 426/526

Fall 2019

Prof. Darcy Barron

Lecture 4: Radiometers

Reminder from last week

- Radiometry: measuring the radiant flux (power) of electromagnetic radiation
 - Microwave radiometry: used to measure temperatures and properties of objects (astronomy and remote sensing)
- Fundamental limits in (classical) optics come from thermodynamics and the wave nature of light
 - Brightness is conserved
 - Diffraction limits the resolution, which depends on the size of the aperture
 - Etendue/throughput/ $A\Omega$ is conserved, and also depends on size of aperture

eVscope | 100 times more powerful than a classical telescope



Finally see distant galaxies, and in partnership with SETI Institute, leverage its ease of use to contribute to science.

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Created by

UNISTELLAR

2,144 backers pledged \$2,209,270 to help bring this project to life.

[Campaign](#)

[FAQ](#) ²⁷

[Updates](#) ²⁸

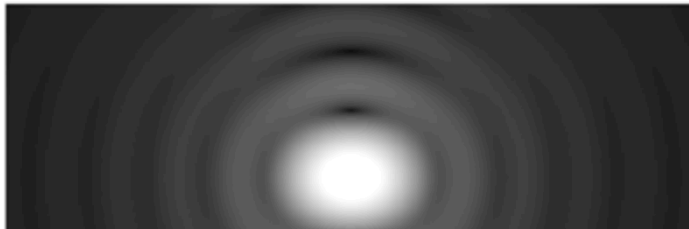
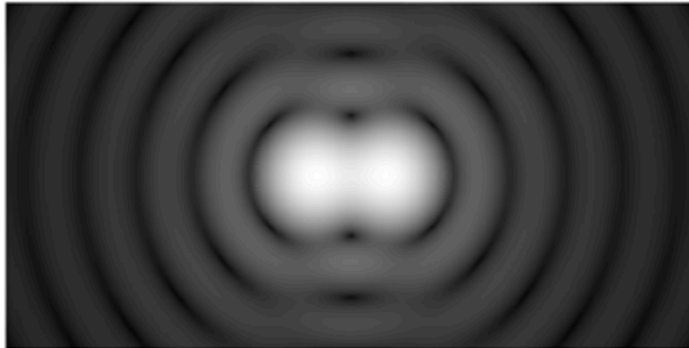
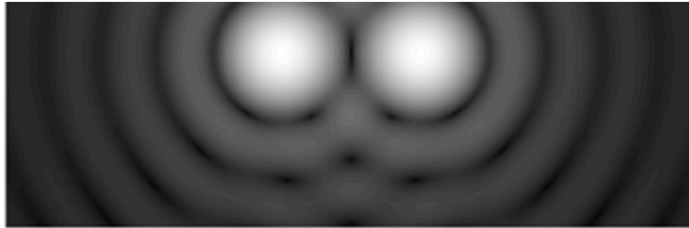
[Comments](#) ^{1,241}

[Community](#)

<https://www.kickstarter.com/projects/unistellar/evscope-100-times-more-powerful-than-a-classical-t>

Quantum mechanics technique allows for pushing past 'Rayleigh's curse'

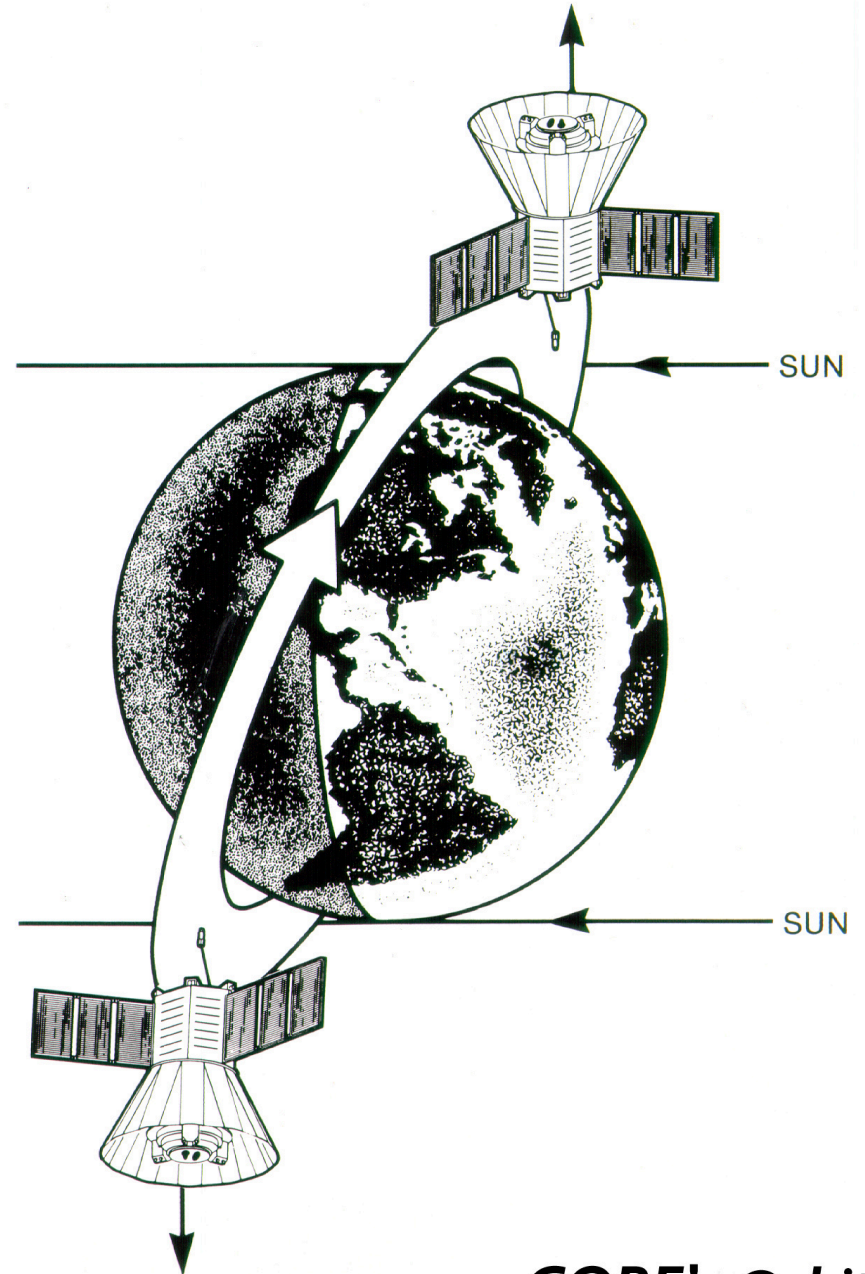
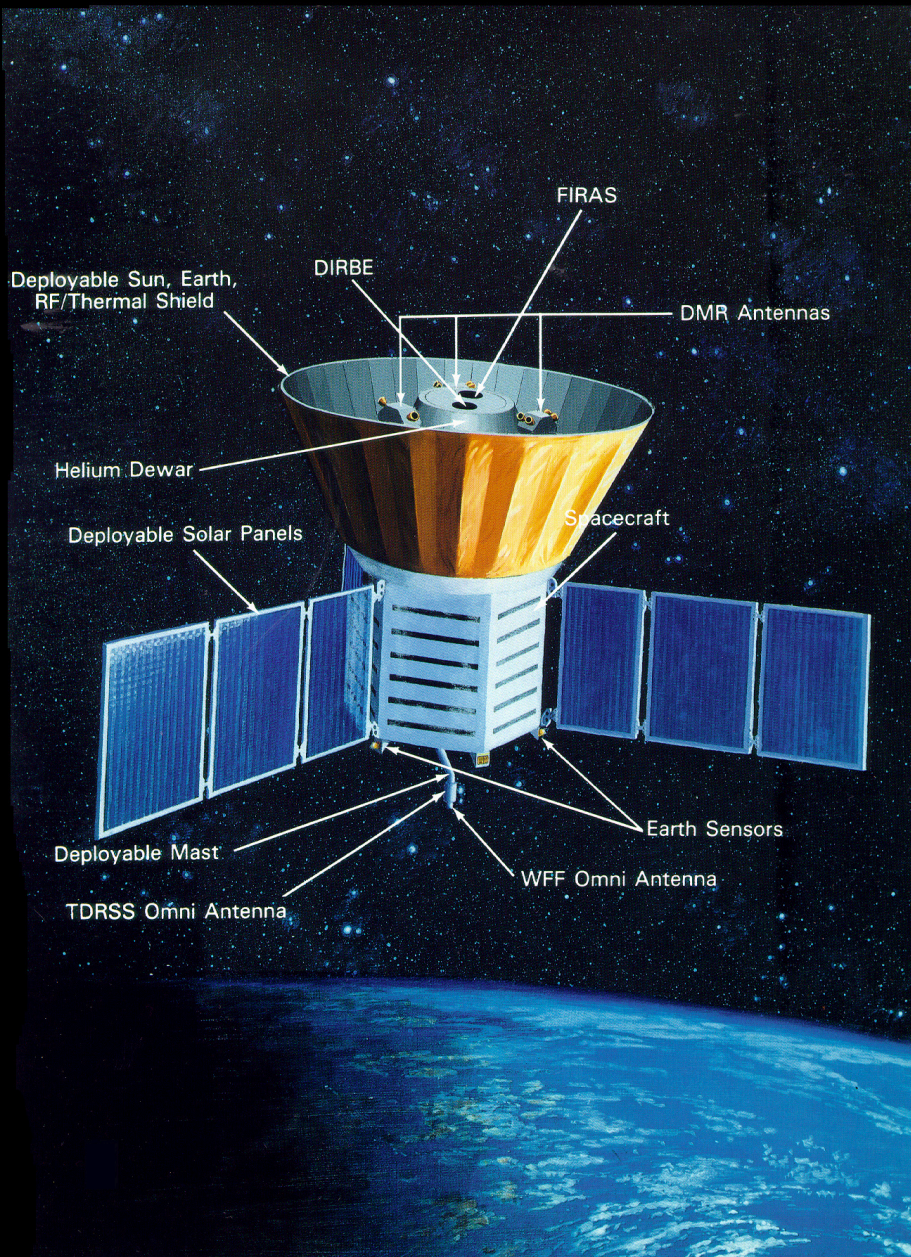
by Bob Yirka , Phys.org



The Rayleigh criterion states that in direct imaging, two light sources are only discernable when the cen...

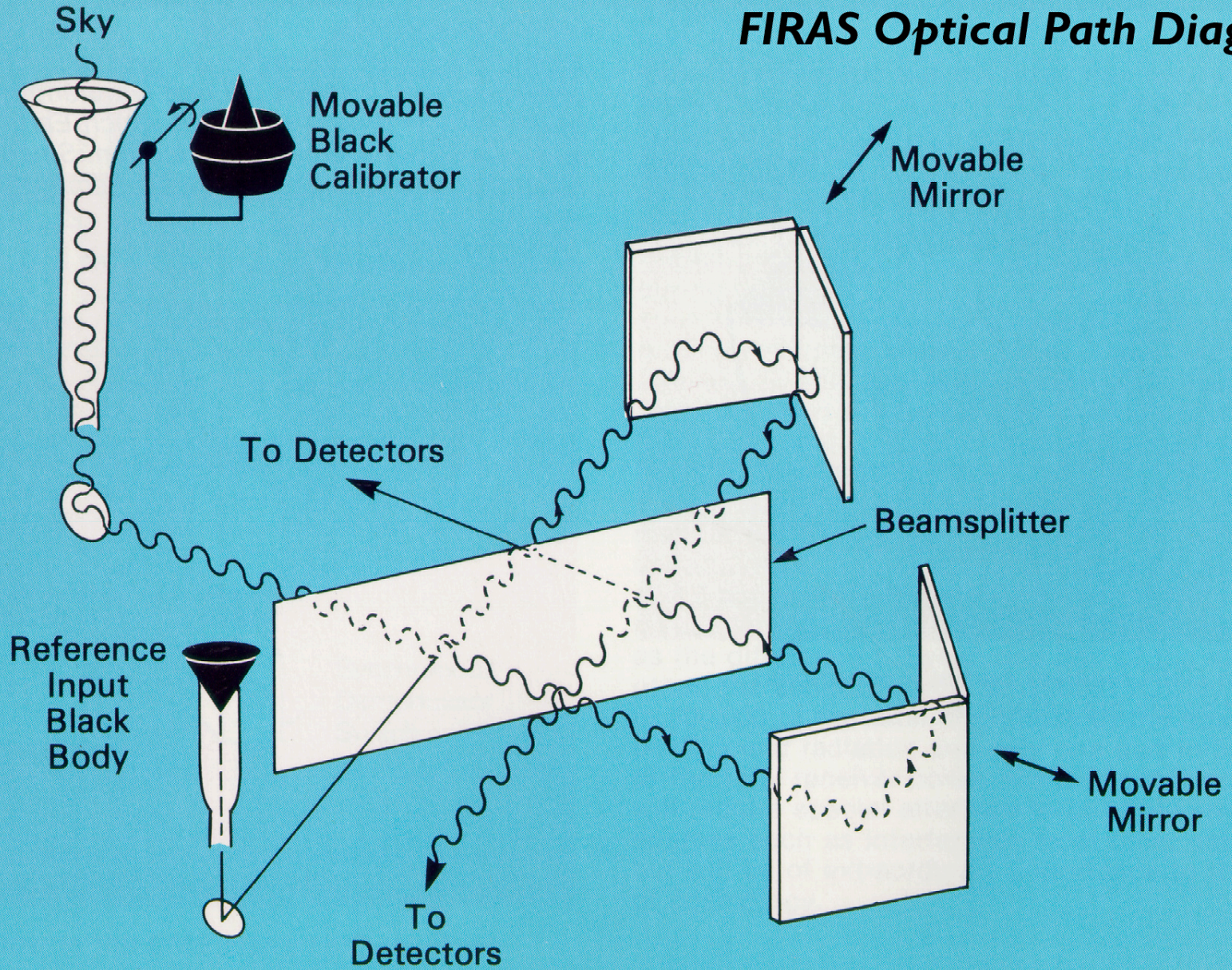
- <https://phys.org/news/2016-09-quantum-mechanics-technique-rayleigh-curse.html>

The COBE Satellite

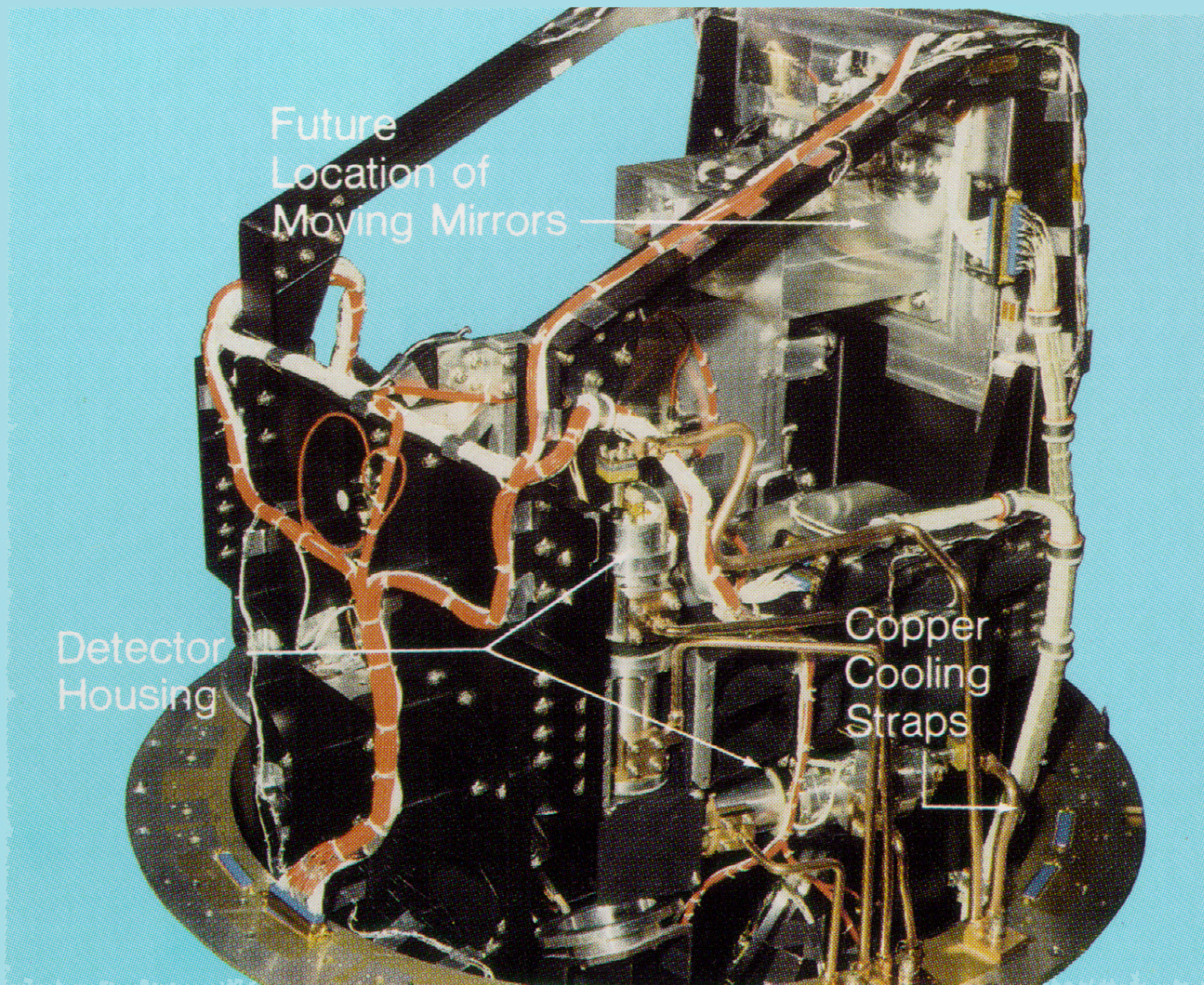


COBE's Orbit

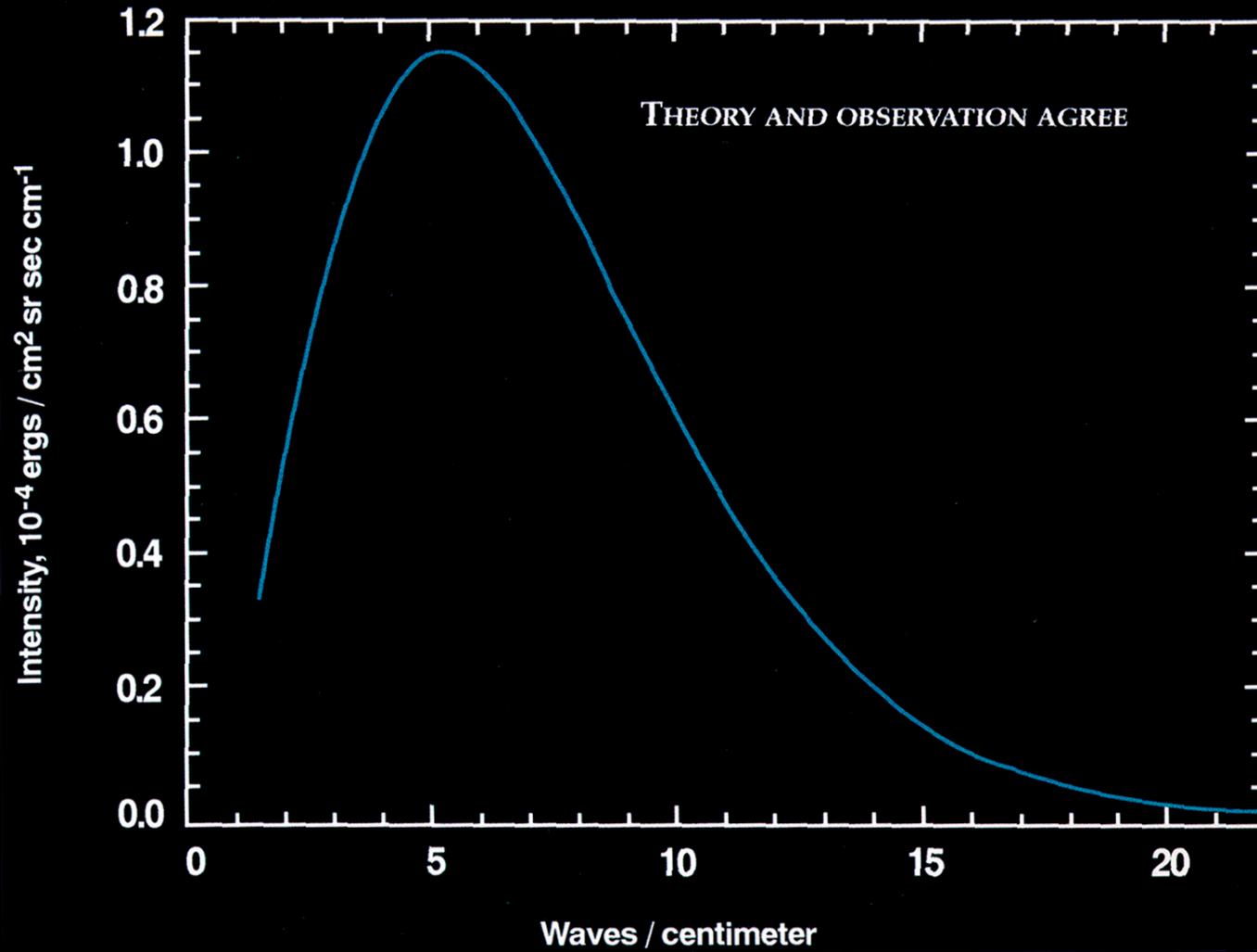
FIRAS Optical Path Diagram



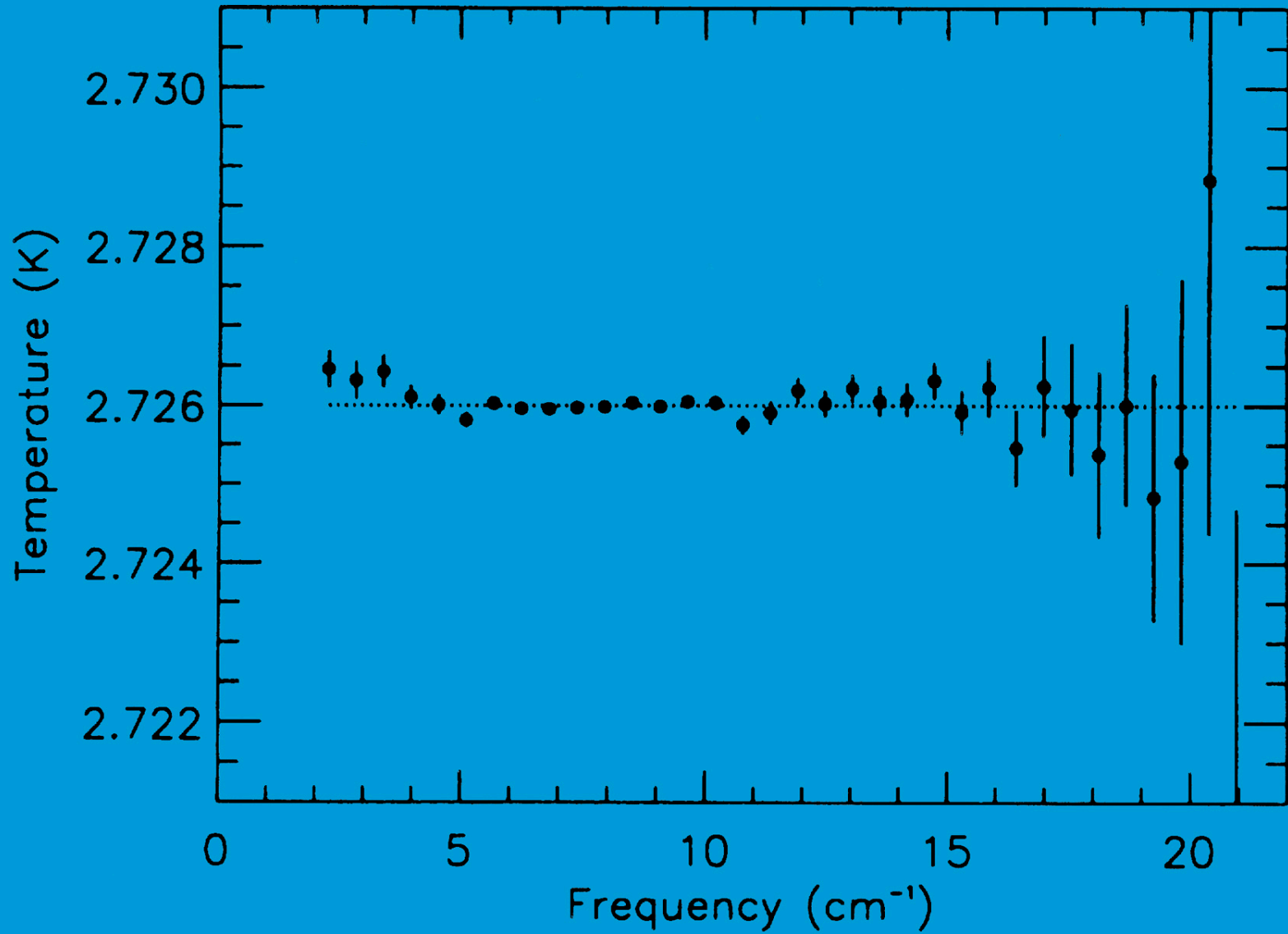
FIRAS Test Unit



COSMIC MICROWAVE BACKGROUND SPECTRUM FROM COBE



FIRAS Residual Spectrum



Submit your notebook

- Print as pdf and submit on Learn by the end of today for credit
- Folder: “In Class Assignments”

For next Wednesday

- No class Monday
- Read chapter 2 of Measuring the Universe
- Homework # 1 is posted on Learn
 - Due Monday, September 9 at the start of class
 - Two parts submitted separately
 - **Part 2 must be submitted through Learn.** Why? It will be graded anonymously and checked for plagiarism (compared with internet sources and other student's work). You are encouraged to work together, but write it in your own words.
- Next week: Telescope design principles