



Diffuse Interstellar Bands: The Search for Extragalactic Biological Molecules

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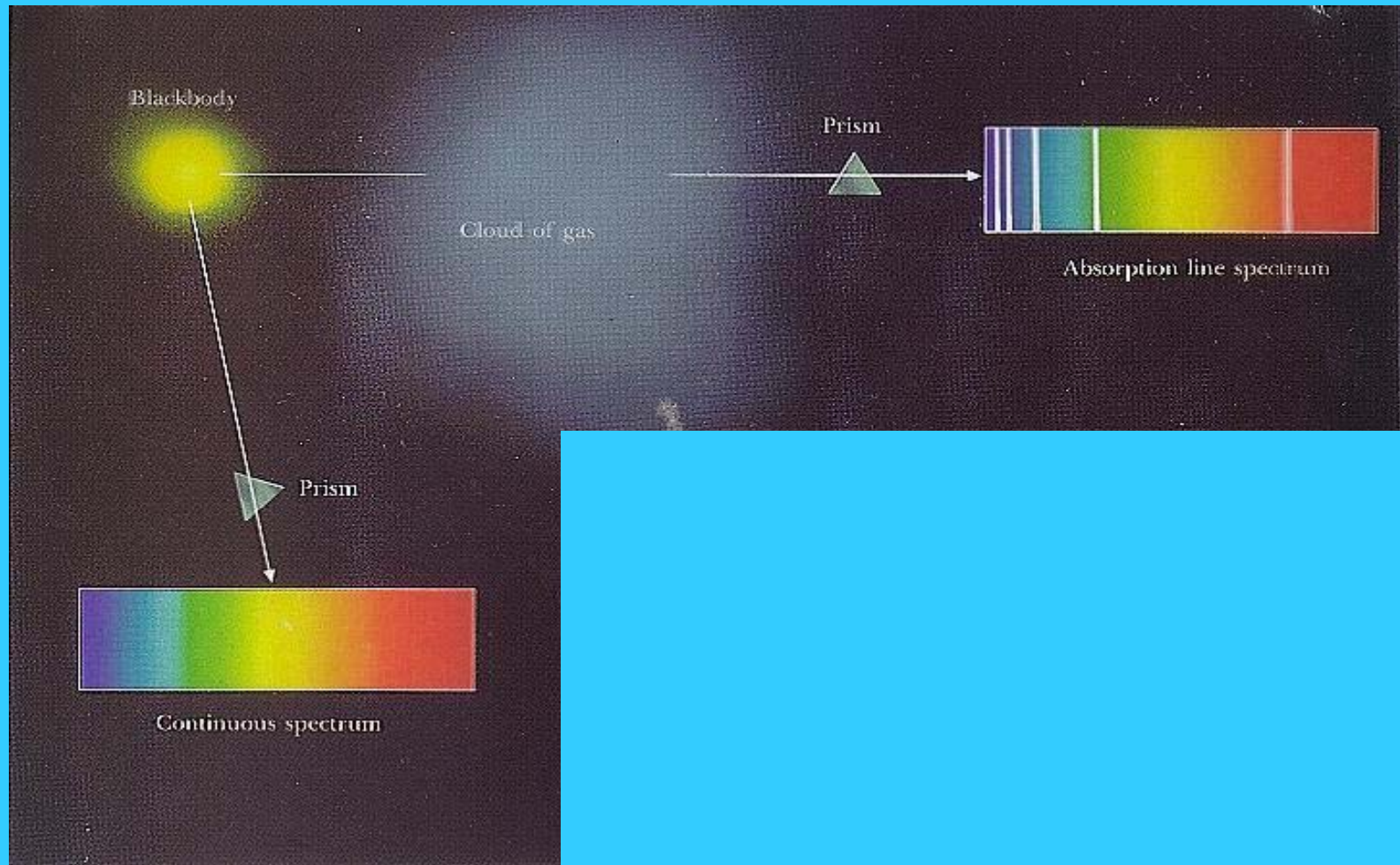
New Mexico State University

Supported by: NMSU Spacegrant

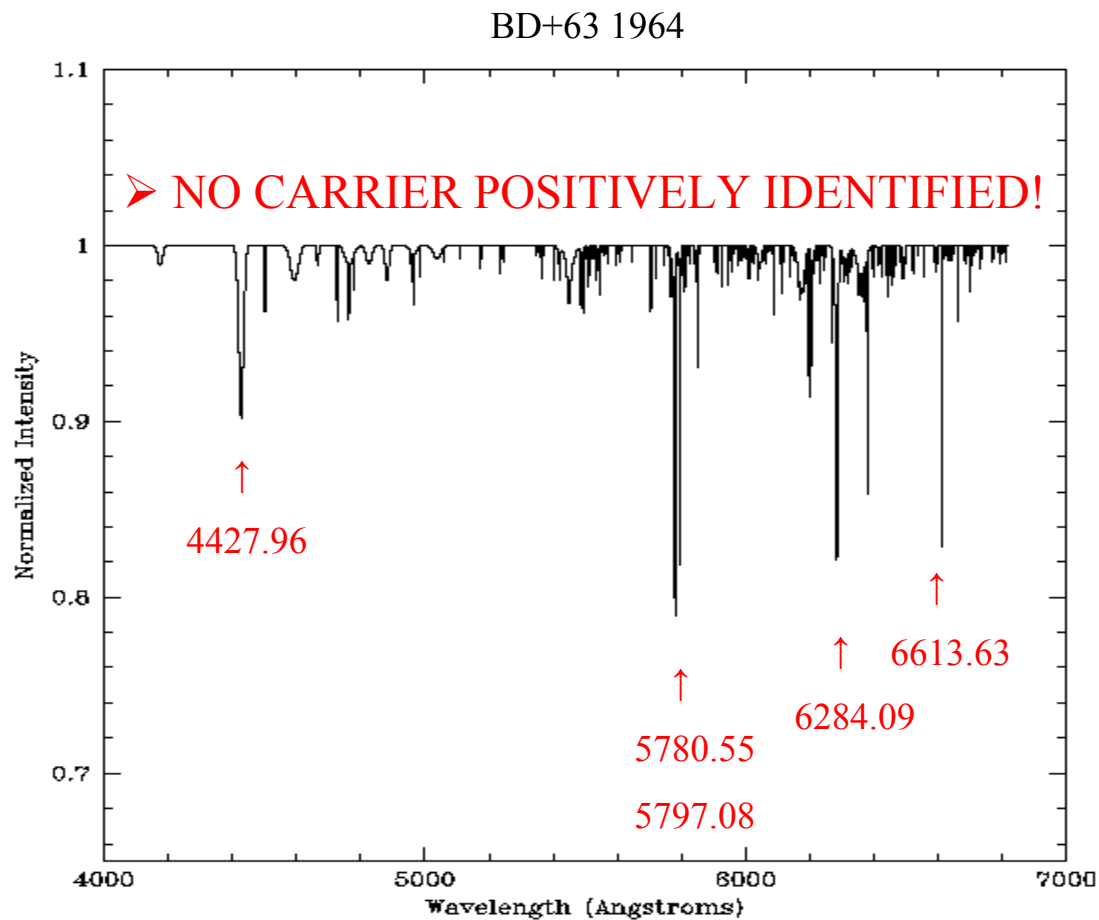
&

NASA GSRP

Spectra



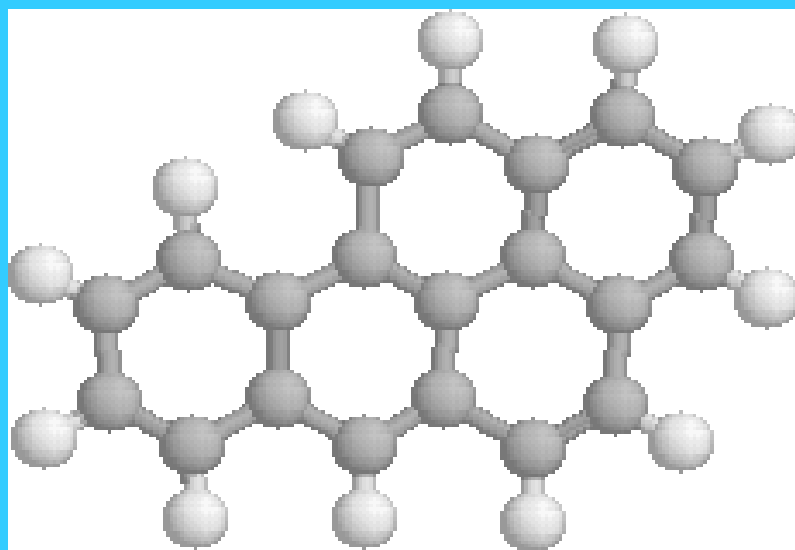
What Are Diffuse Interstellar Bands (DIBs)?



Courtesy of Pascale Ehrenfreund, Leiden University

Polycyclic Aromatic Hydrocarbons (PAHs) as DIBs

Benzo-pyrene



Benzene – C_6H_6

- PAHs composed of cosmically abundant elements
- PAHs tend to have spectra in visible light
- PAHs relatively stable in ISM conditions

PAHs & Astrobiology

NASA OSS: Astronomical Search for Origins

“How do different galactic ecosystems (of stars and gas) form and which can lead to planets and living organisms?”

<http://origins.jpl.nasa.gov/universe/ra2.html>



Courtesy of Andy Christie of Slimfilms.com (for July '99 Scientific American)

Extragalactic DIBs: QSO Absorption-Line Systems



Trends: EW vs. N(HI)

• Herbig, G. H., 1993

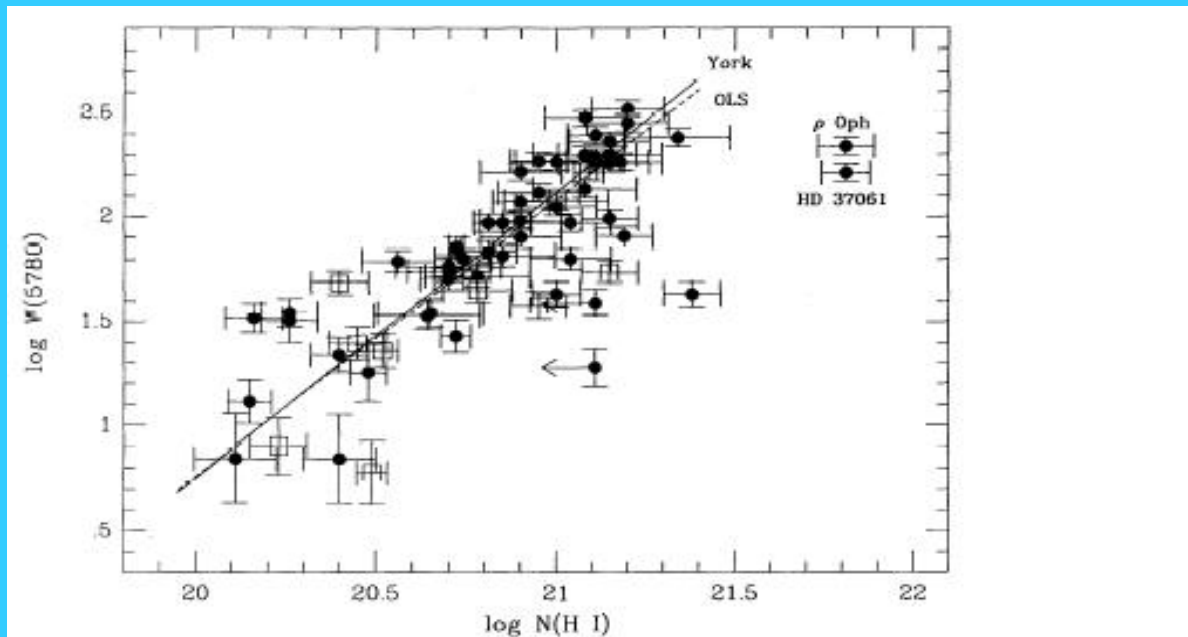
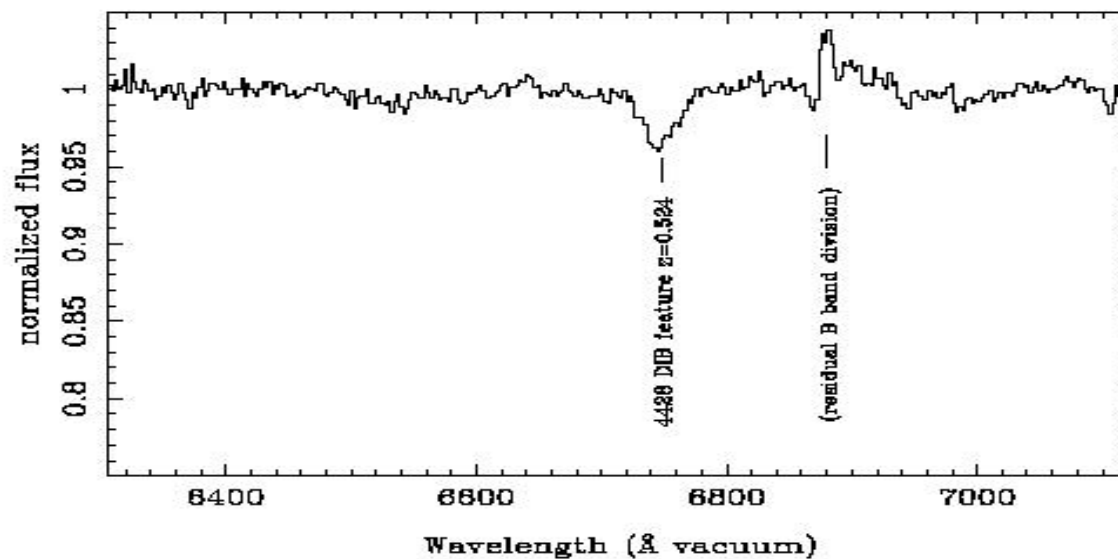


FIG. 8.—Dependence of $W(5780)$ upon the column density of neutral hydrogen, $N(\text{H I})$. The horizontal error bars are those given by the H I observers, but those in the vertical direction correspond to the rough recipe for W uncertainty given in the text and so are not true standard deviations or probable errors. The solid regression line was obtained by the procedure of York (1966), but with the data points for ρ Oph, the two upper limits, and four stars in the Orion Nebula (θ^1 Ori C, θ^2 Ori br, HD 37061, and HD 36959) omitted. The dashed line was obtained for the same data set by the ordinary least-squares (OLS) bisector procedure, which takes no account of the weights of the individual data points.

➤ Large $N(\text{HI})$ – Stronger DIB Lines!

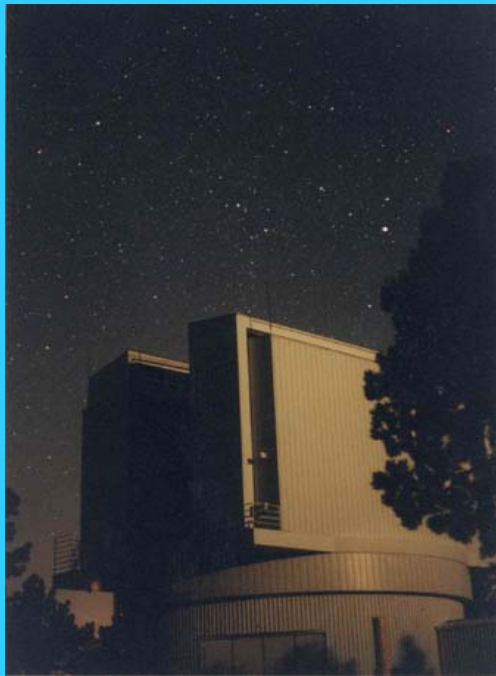
Known QSOALS Systems with DIBs:

- **ONE** QSOALS:
 - Junkkarinen, V.T., et al., **June 2004** -
 - Very Large Amount of Hydrogen



Current Plans

APO



- 3.5 m
- Have Time

SDSS



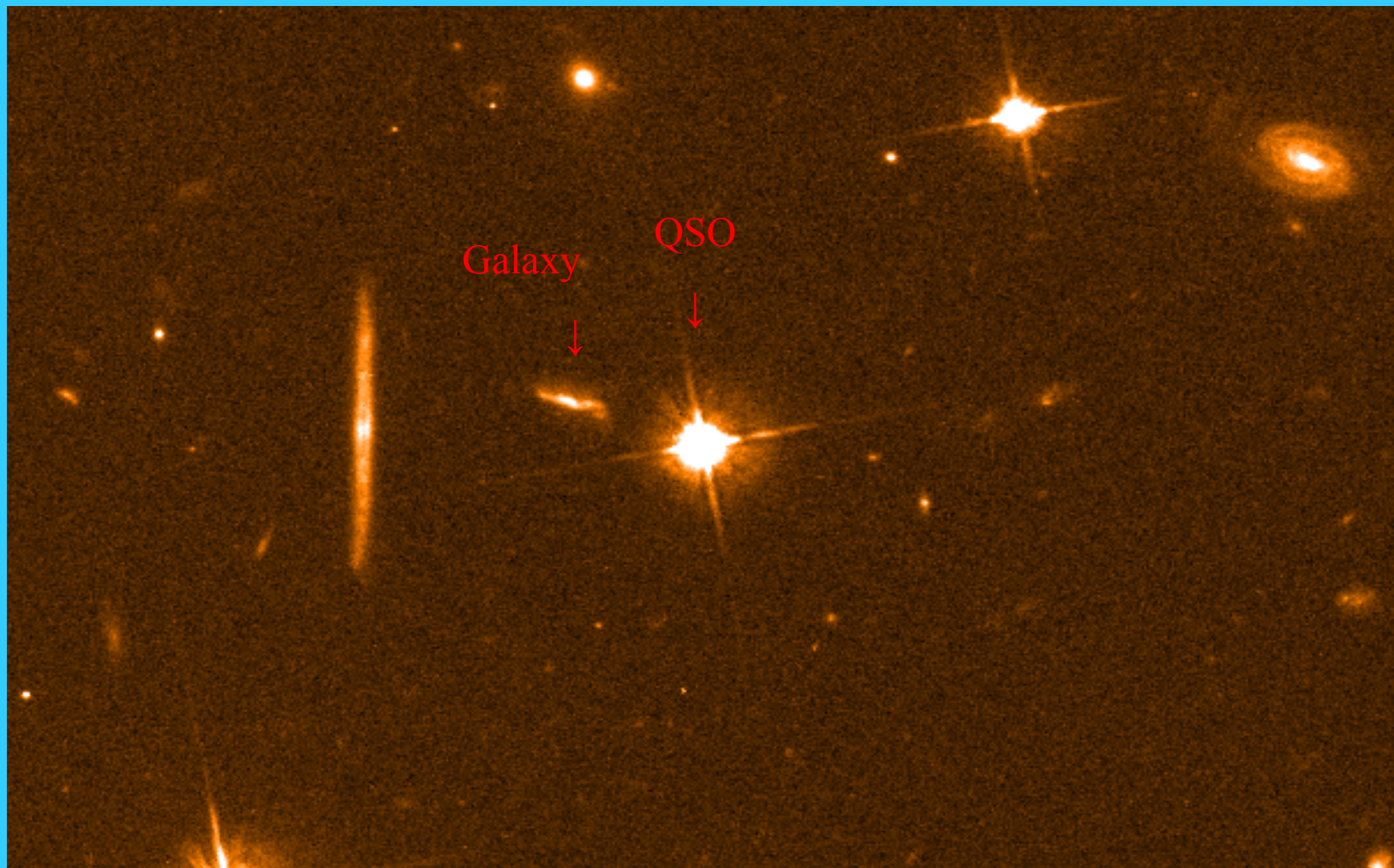
- 2.5 m
- Increase Target List - Ongoing

Gemini

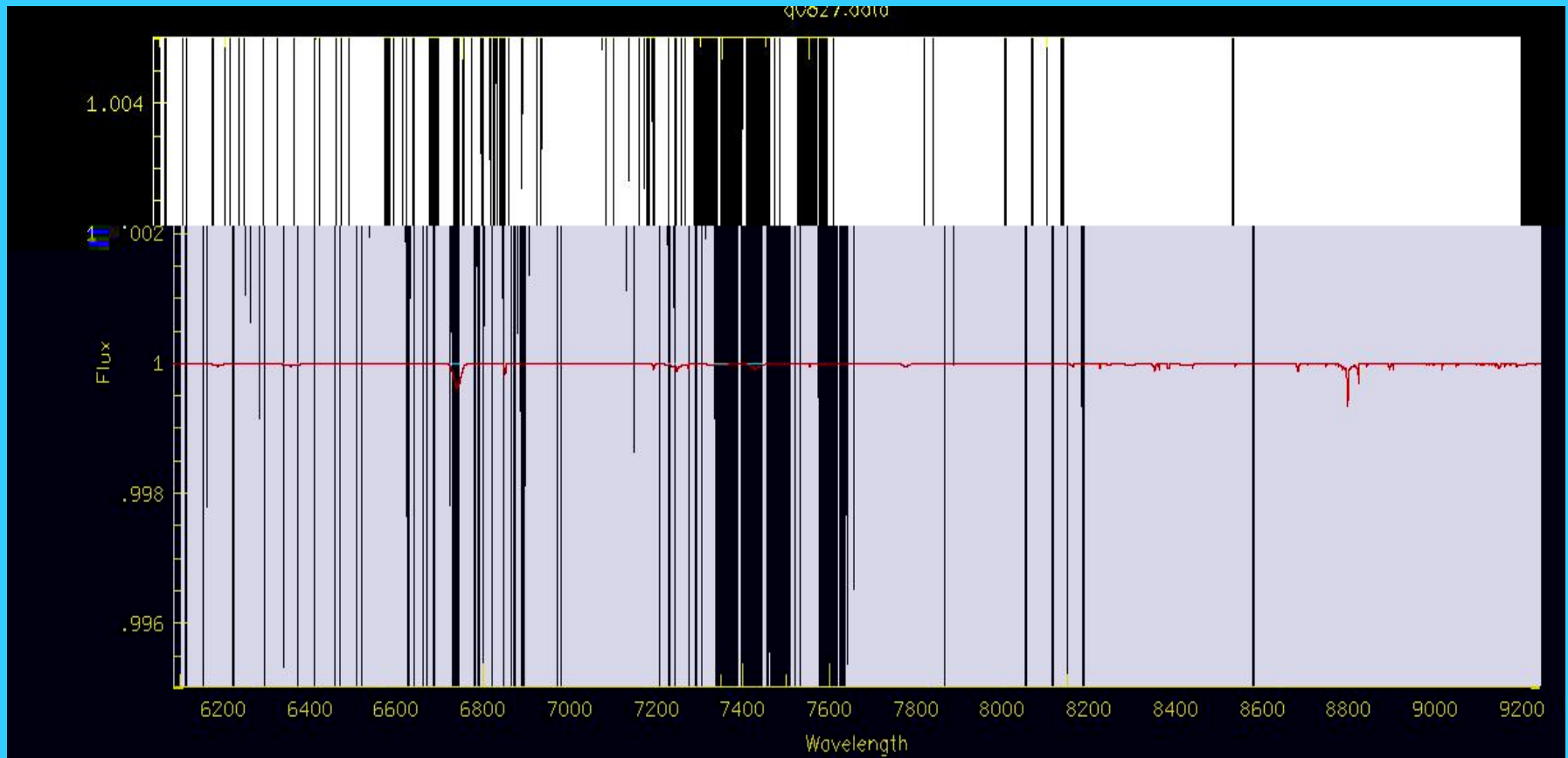


- 8.1 m
- Collaboration Has Time

QSO 0827+243: First Look



Corrected QSO 0827+243



- High Resolution Keck Spectra Courtesy of Wallace Sargent, Caltech

References:

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