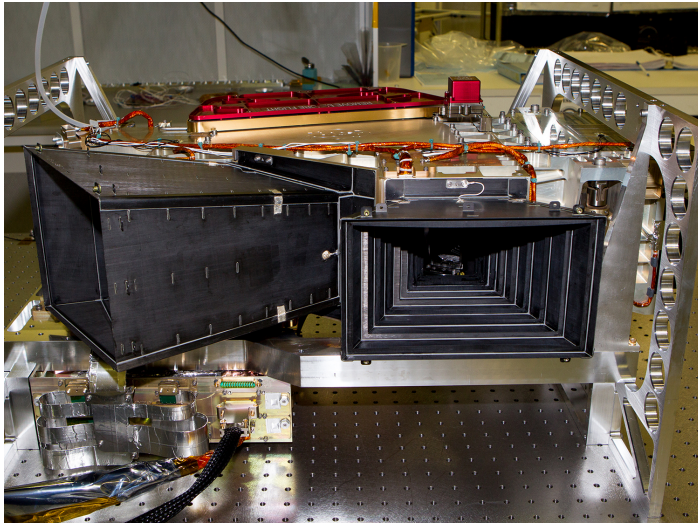# The Martian upper atmosphere studies using the data from Imaging Ultraviolet Spectrograph (IUVS) onboard MAVEN

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MAVEN Remote Sensing

Imaging Ultraviolet Spectrograph

Wavelength range
      FUV: 110 – 190nm
      MUV: 180– 340nm

Detectors: Image-intensified 2-D
    active pixel sensors

Cost to build: $22M

Science Team funding: $2M/ year

**Laboratory for Atmospheric
and Space Physics (LASP)
University of Colorado**

Science Lead: Nicholas Schneider
Instrument Lead: William McClintock
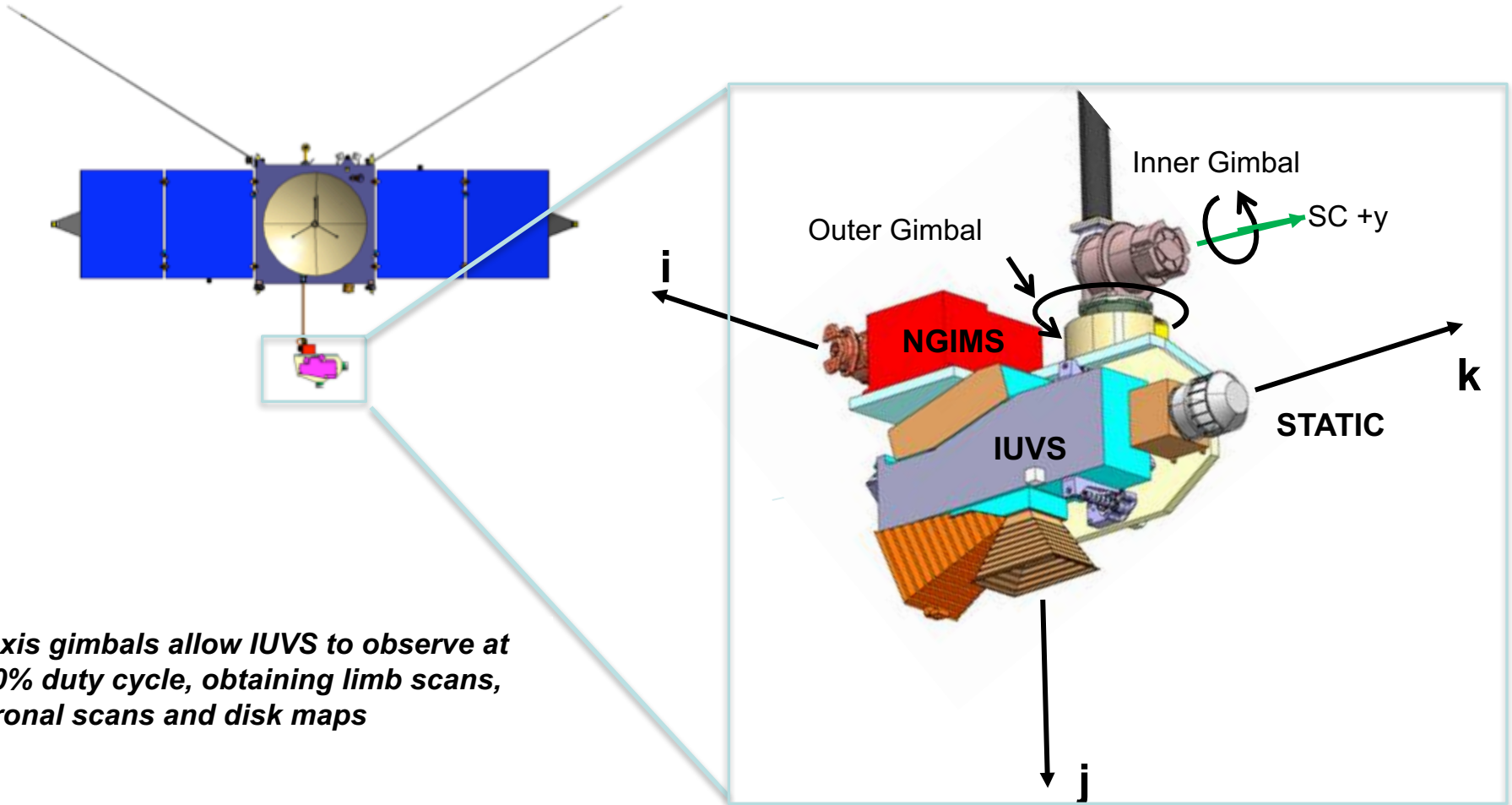*Project Manager:* Rory Barrett

Observations
- Limb scans near periapsis
- Disk imaging near apoapsis
- D/H and Oxygen coronal mapping
- Stellar occultations

*PDS products include derived quantities
(e.g., densities, temperatures) in
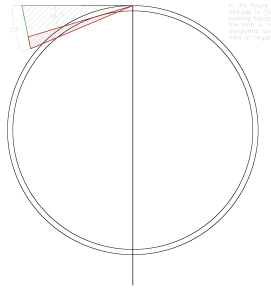addition to raw & calibrated data*

IUVS Accommodation & Pointing Capability

During most normal operations, the spacecraft flies with solar arrays and body-mounted instruments exactly sun-pointing
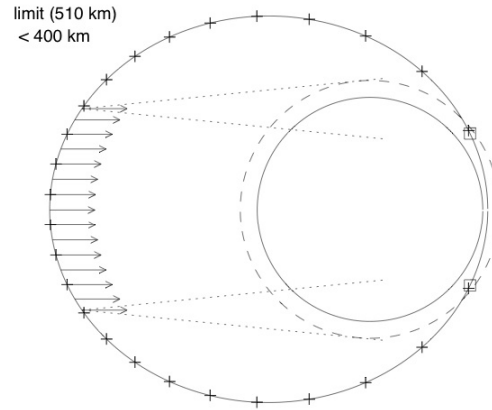
IUVS, NGIMS and STATIC are located on the Articulated Payload Platform (APP) which uses uses two gimbals to orient one instrument axis

2-axis gimbals allow IUVS to observe at >50% duty cycle, obtaining limb scans, coronal scans and disk maps
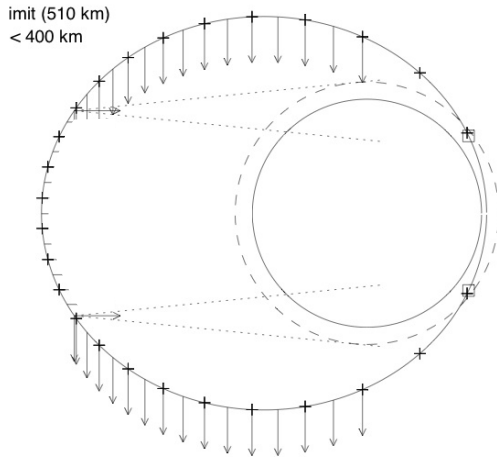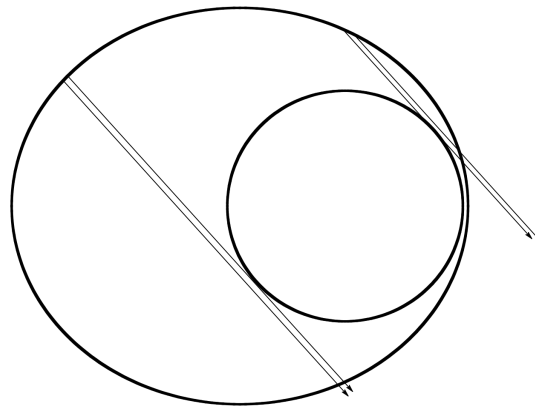
IUVS' Four Observing Modes

Periapse Limb Scans

Apoapse Imaging

Coronal Scans (O & D/H)

Stellar Occultation Campaigns

- Each mode has specific pointing strategies, optical and detector settings

- Periapse Imaging and Coronal Scans alternate with orbits STATIC and NGIMS at a pre-determined cadence.

- Coronal Scans for O and D/H use identical pointing (inwards on the ascending leg, outward on the descending leg)

- Stellar Occultations occur during dedicated 1- or 2-day campaigns

Ultraviolet

Infrared
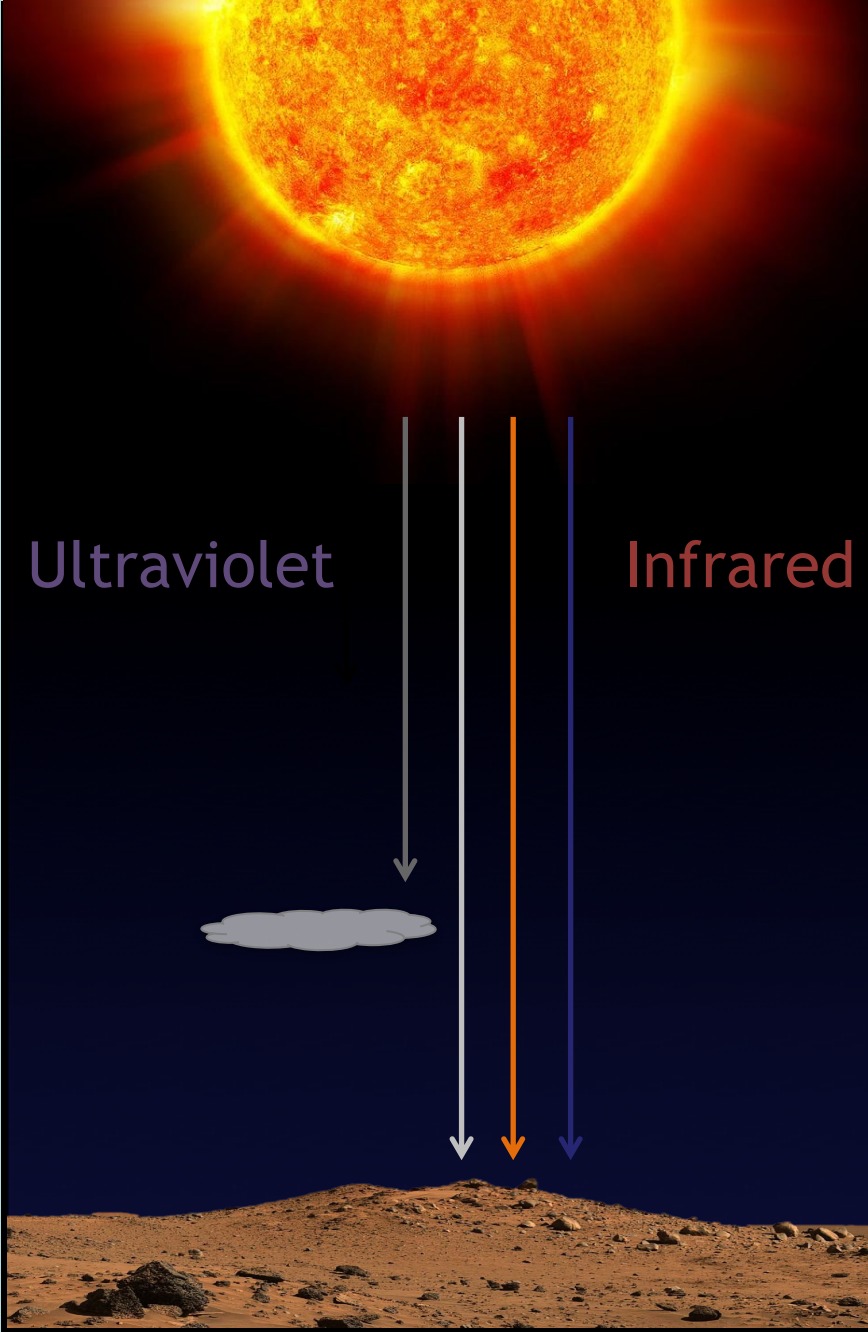
Extreme Ultraviolet light heats
the upper atmosphere
creating the **thermosphere**

Thermosphere

120 km

Altitude

Temperature
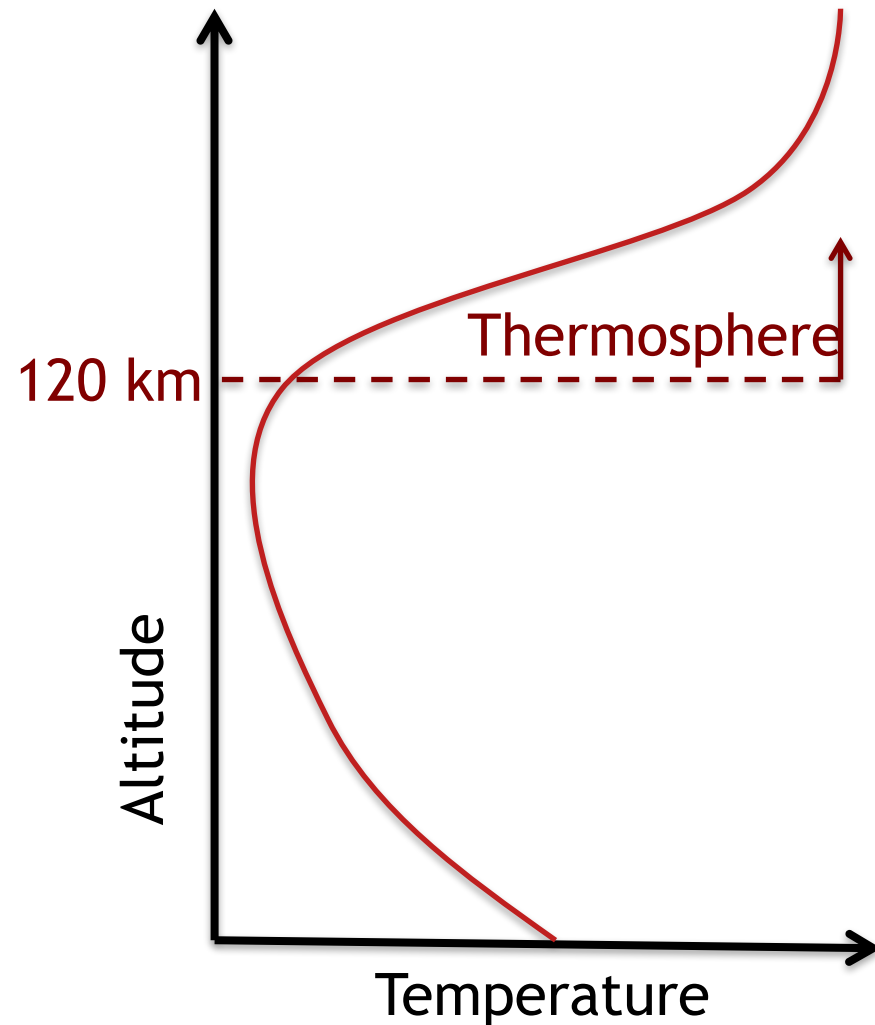
IUVS: FUV and MUV limb scan

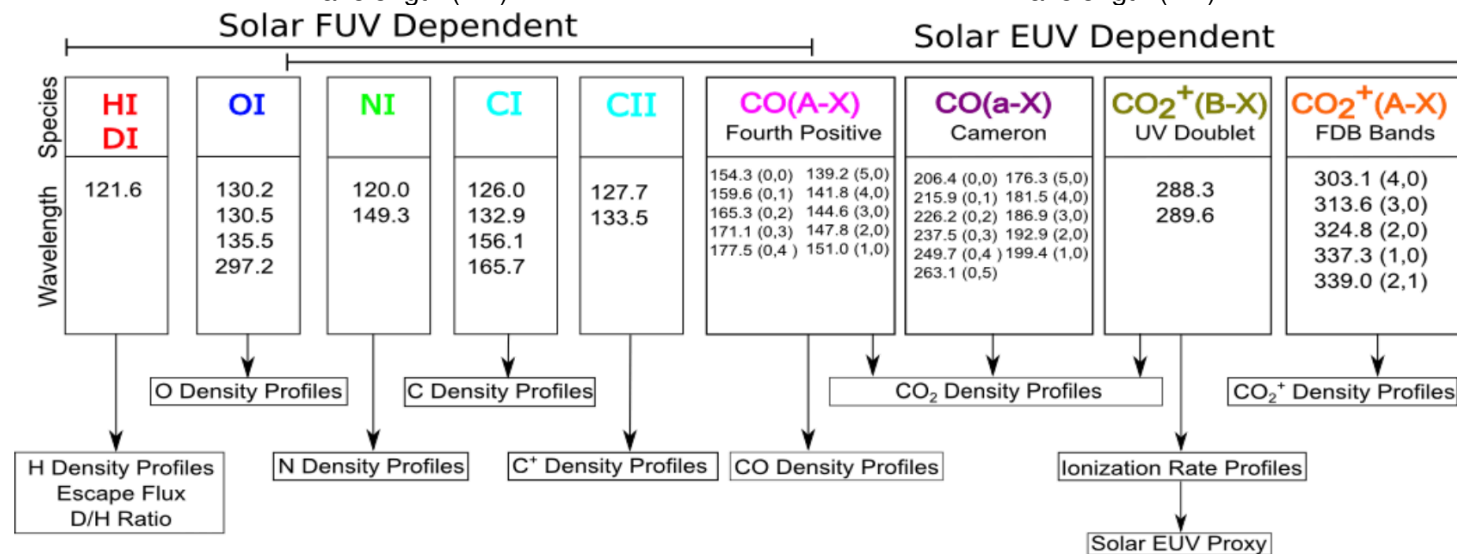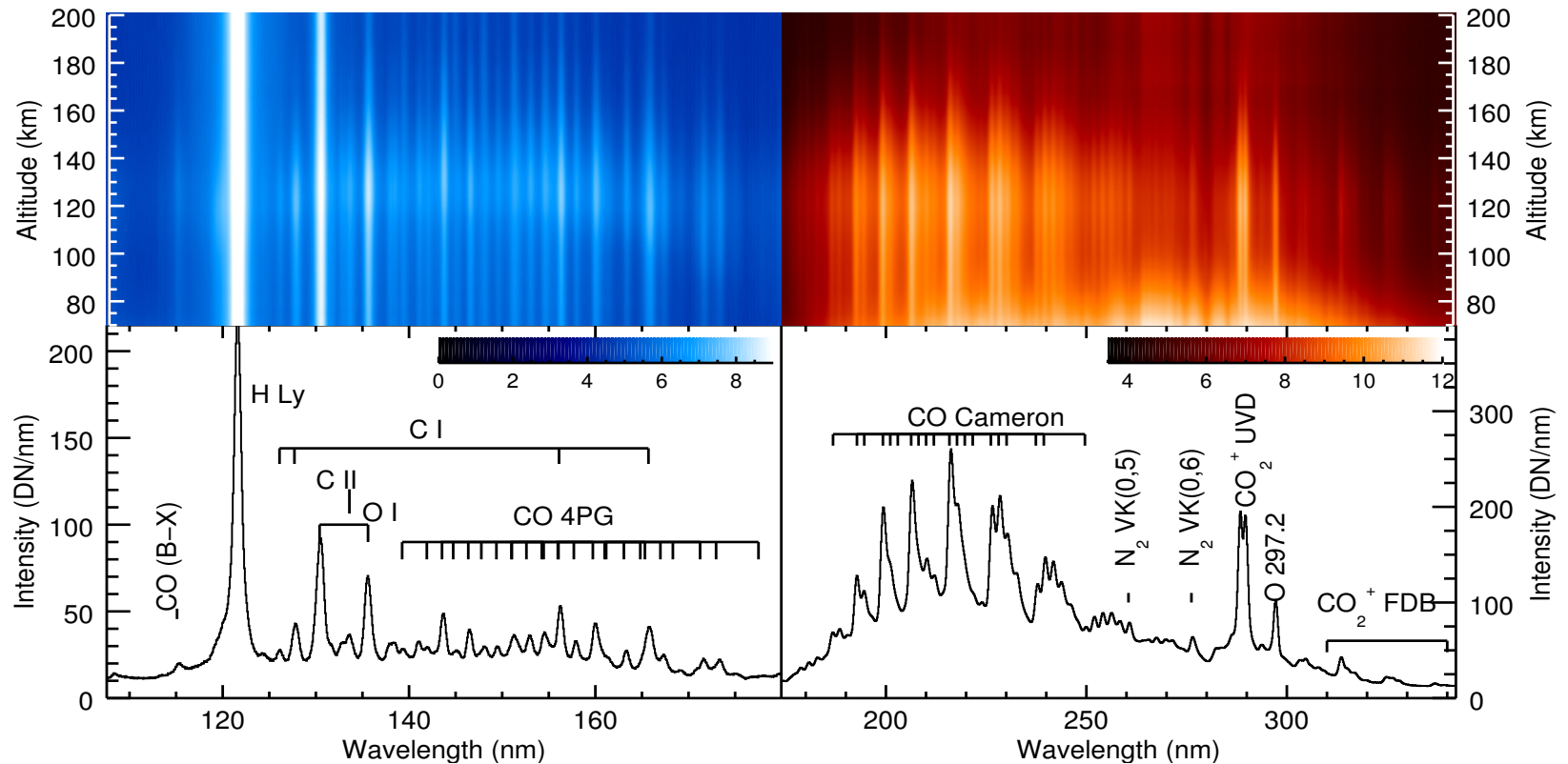| Species	HI DI	OI	NI	CI	CII	CO(A-X) Fourth Positive	CO(a-X) Cameron	CO₂⁺(B-X) UV Doublet	CO₂⁺(A-X) FDB Bands
Wavelength	121.6	130.2 130.5 135.5 297.2	120.0 149.3	126.0 132.9 156.1 165.7	127.7 133.5	154.3 (0,0) 139.2 (5,0) 159.6 (0,1) 141.8 (4,0) 165.3 (0,2) 144.6 (3,0) 171.1 (0,3) 147.8 (2,0) 177.5 (0,4) 151.0 (1,0)	206.4 (0,0) 176.3 (5,0) 215.9 (0,1) 181.5 (4,0) 226.2 (0,2) 186.9 (3,0) 237.5 (0,3) 192.9 (2,0) 249.7 (0,4) 199.4 (1,0) 263.1 (0,5)	288.3 289.6	303.1 (4,0) 313.6 (3,0) 324.8 (2,0) 337.3 (1,0) 339.0 (2,1)

Solar FUV Dependent — Solar EUV Dependent

O Density Profiles
C Density Profiles
CO₂ Density Profiles
CO₂⁺ Density Profiles

H Density Profiles Escape Flux D/H Ratio
N Density Profiles
C⁺ Density Profiles
CO Density Profiles
Ionization Rate Profiles
Solar EUV Proxy

- If you are interesting in UV spectroscopy and helping in the analysis of IUVS data to understand the Martian thermospheric variability.
- The proposed study will focus on IUVS airglow data to understand EUV deposition and its spatial and temporal variability.

Please contact:

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