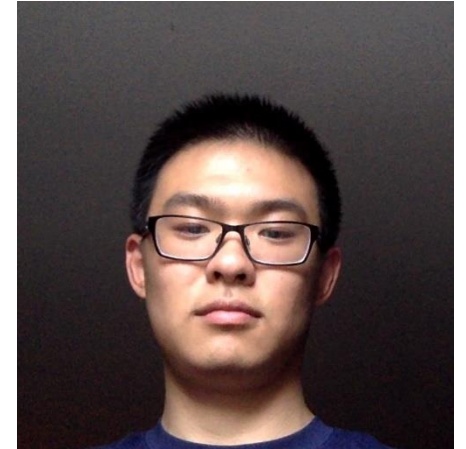
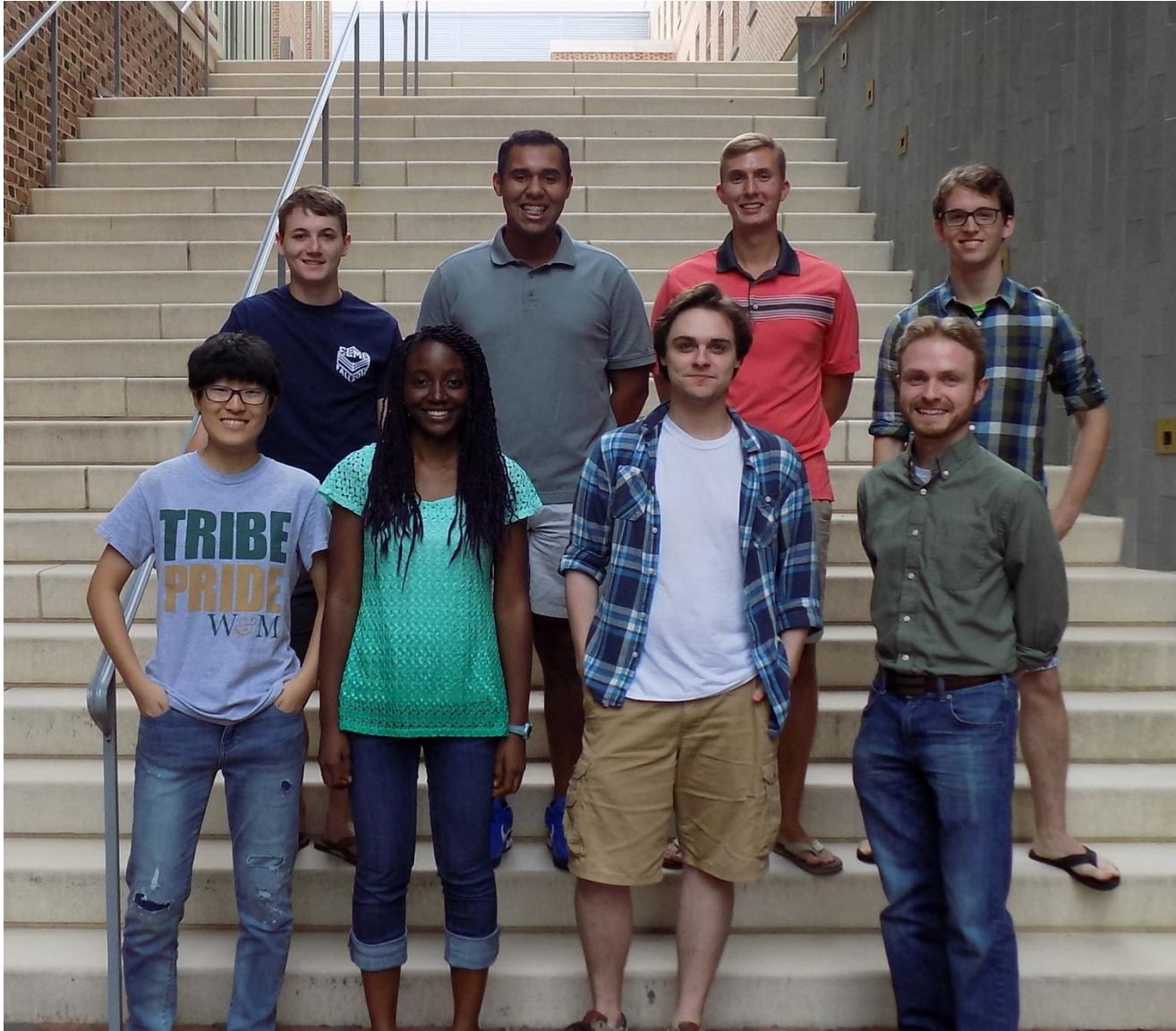


Laser-Based Techniques to Explore Atmospheric Chemical Reactions

Research in the Kidwell Group

Office: ISC 1287; Lab: ISC 1243; Email: nmkidwell@wm.edu

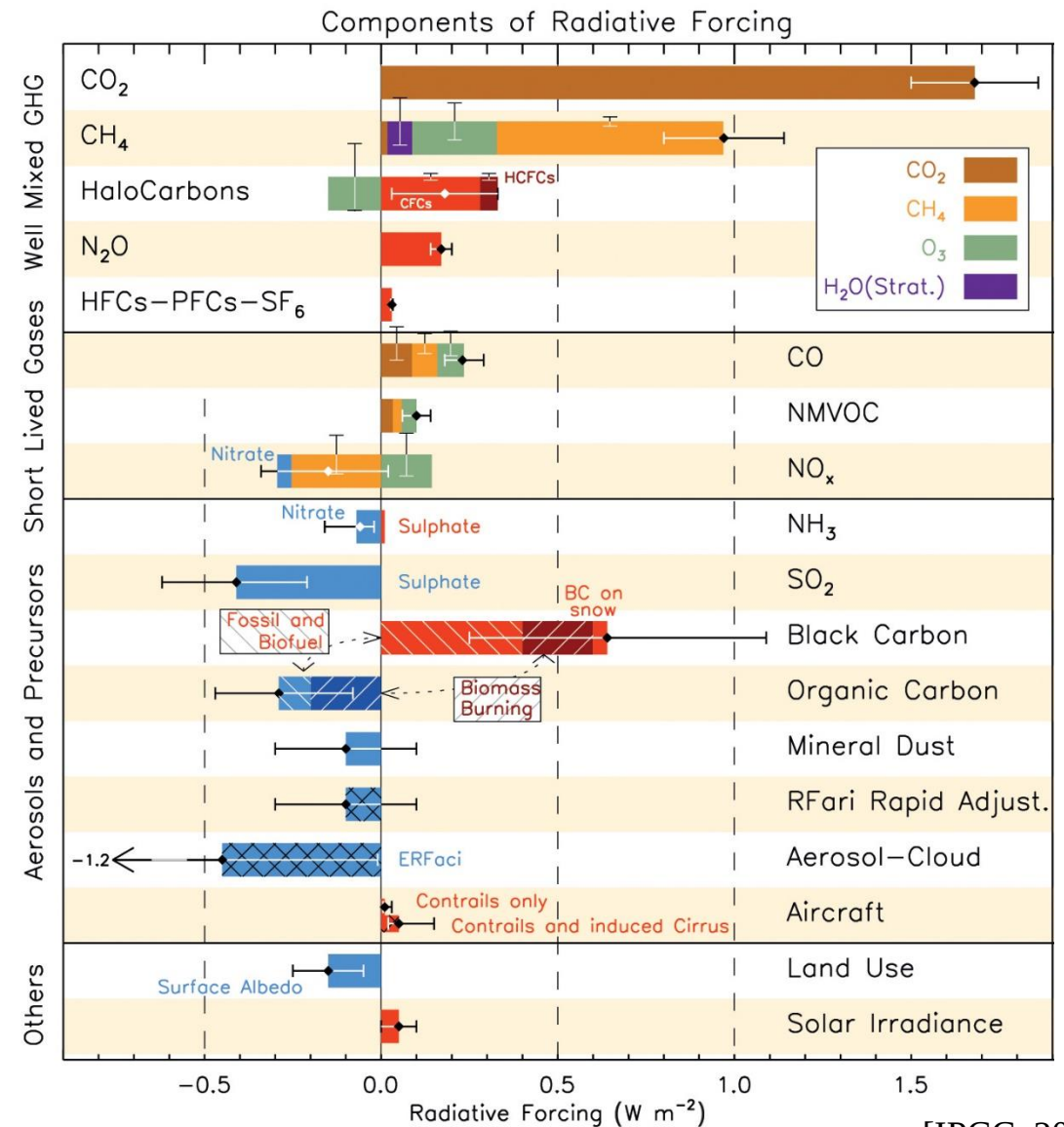
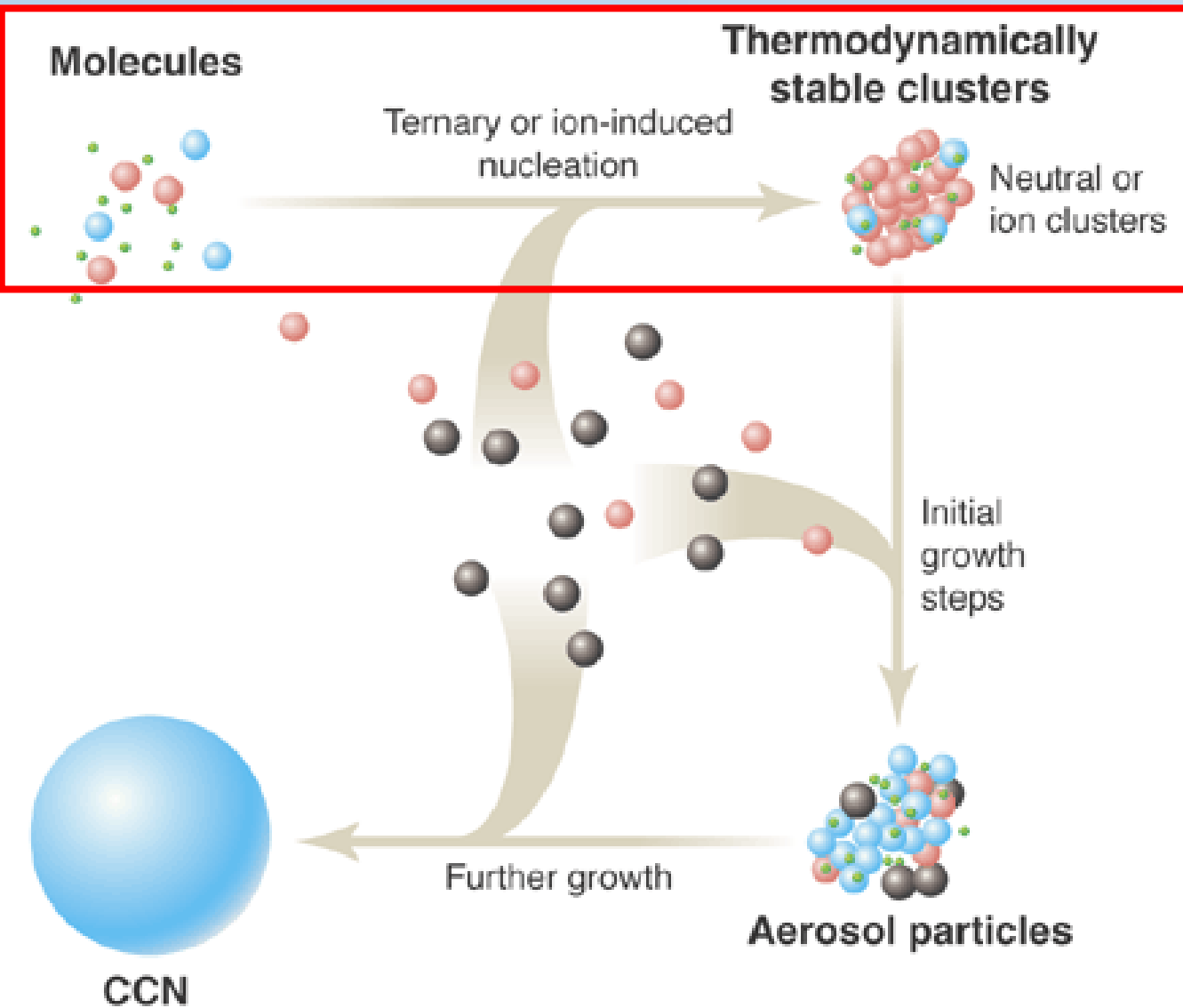
Kidwell Group Fall 2017



The Laser Lab



Aerosol Formation

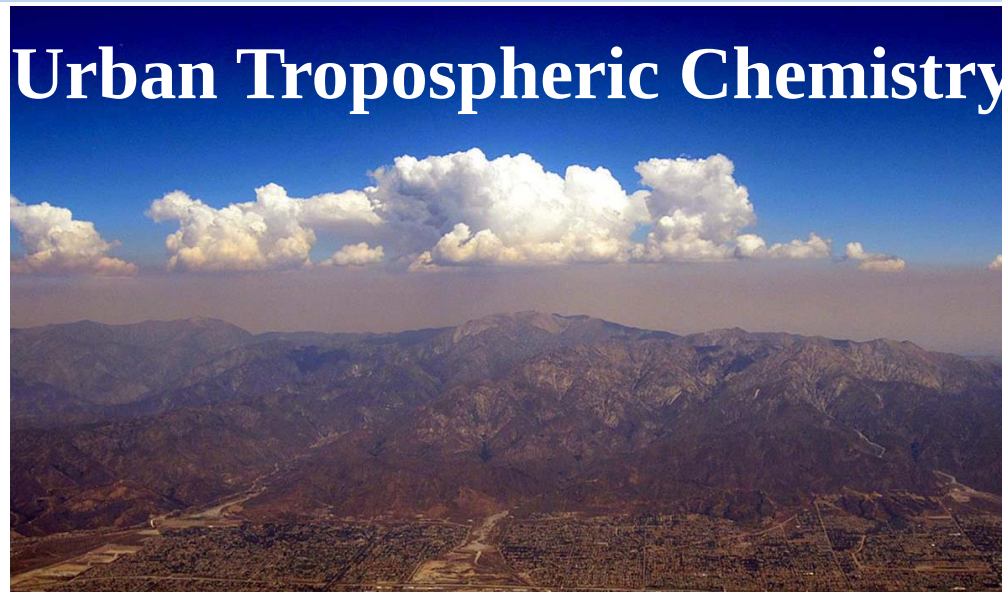


[IPCC, 2013]

Kulmala, M., Science, **2003**, 302, 1000

Atmospheric Chemistry in the Kidwell Research Group

Urban Tropospheric Chemistry

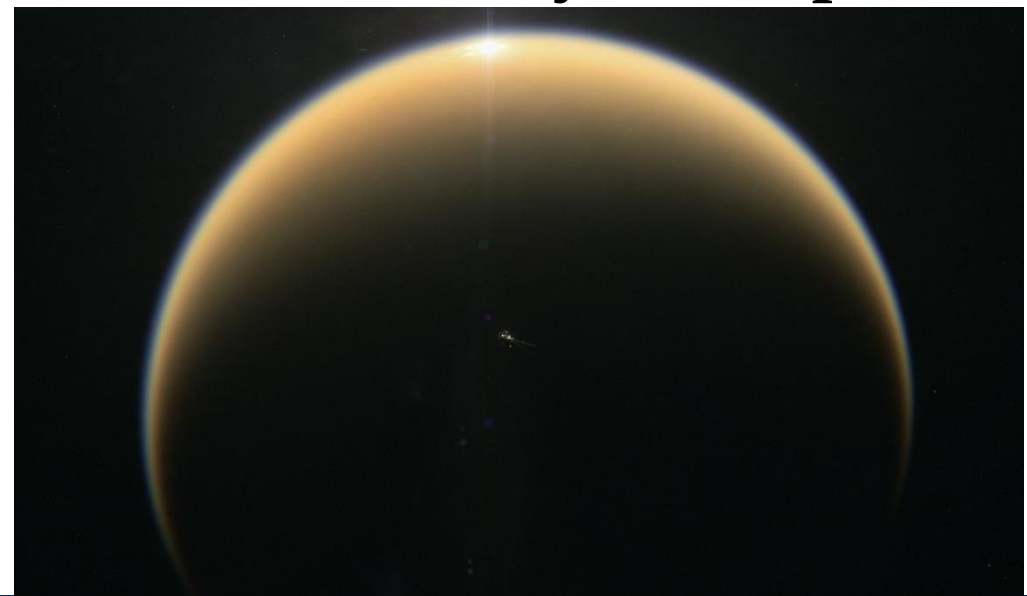


All three projects are investigating the first few nucleation events towards aerosol formation under different conditions

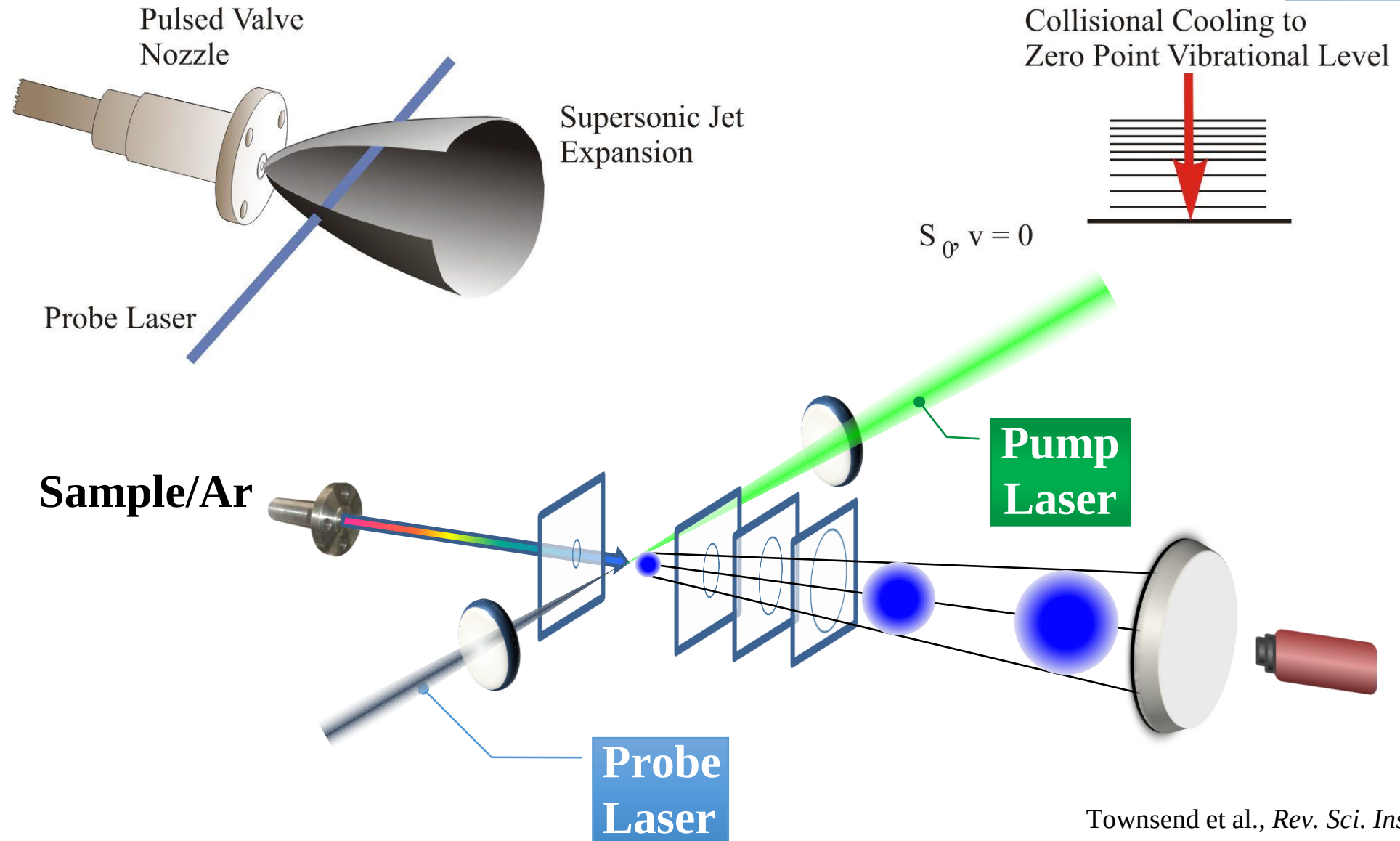
Marine Chemistry



Planetary Atmospheres



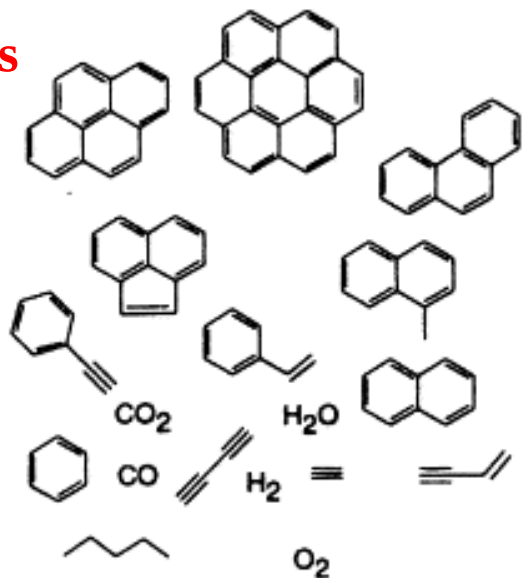
Our Experimental Tool Kit



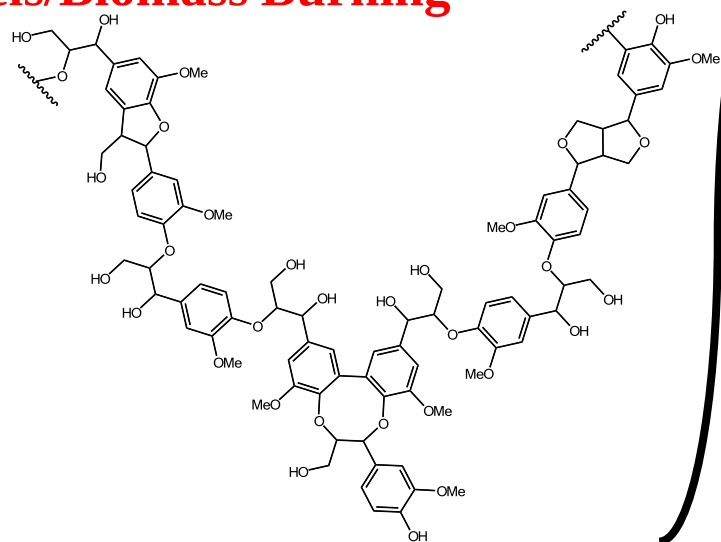
Townsend et al., *Rev. Sci. Instrum.* **2003** 74, 2530
Eppink et al., *Rev. Sci. Instrum.* **1997** 68, 2477

Anthropogenic Emissions in Urban Tropospheres

Fossil Fuels

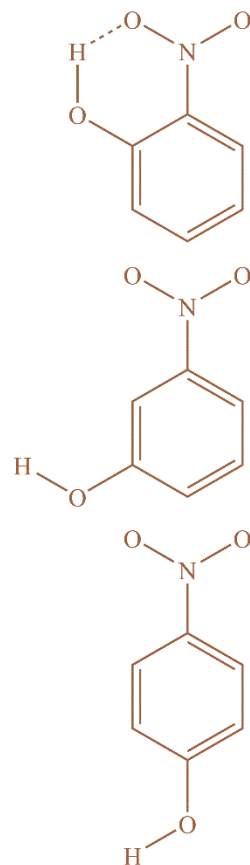


Biofuels/Biomass Burning

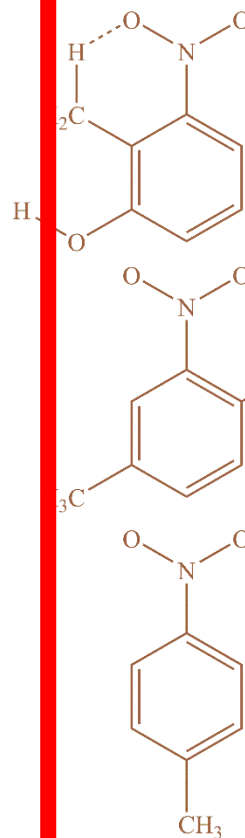


Brown Carbon Molecules

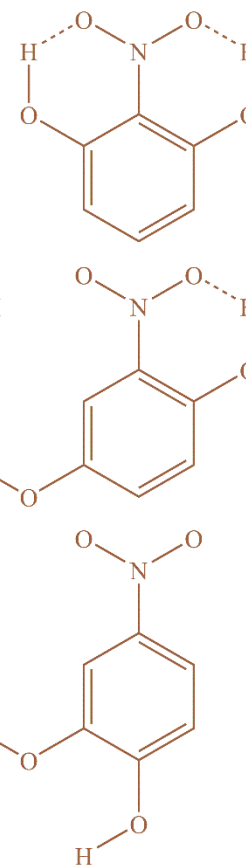
Nitrophenols



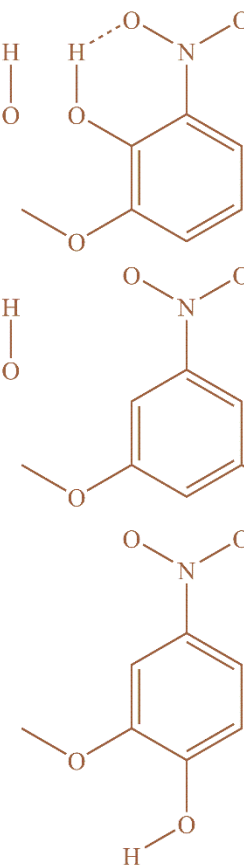
Nitrocresols



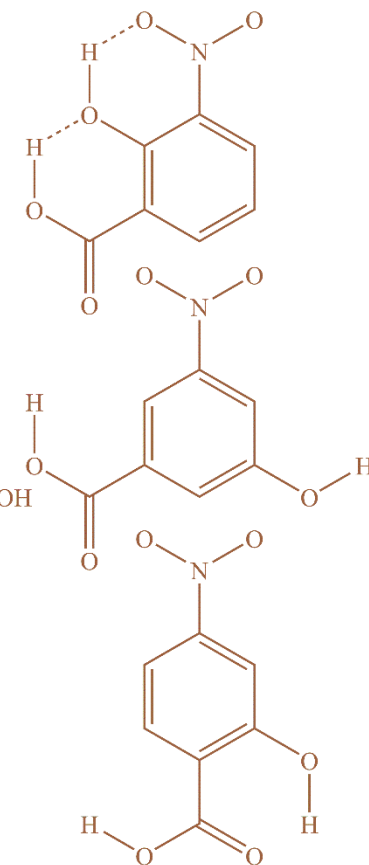
Nitrocatechols



Nitroguaiacols



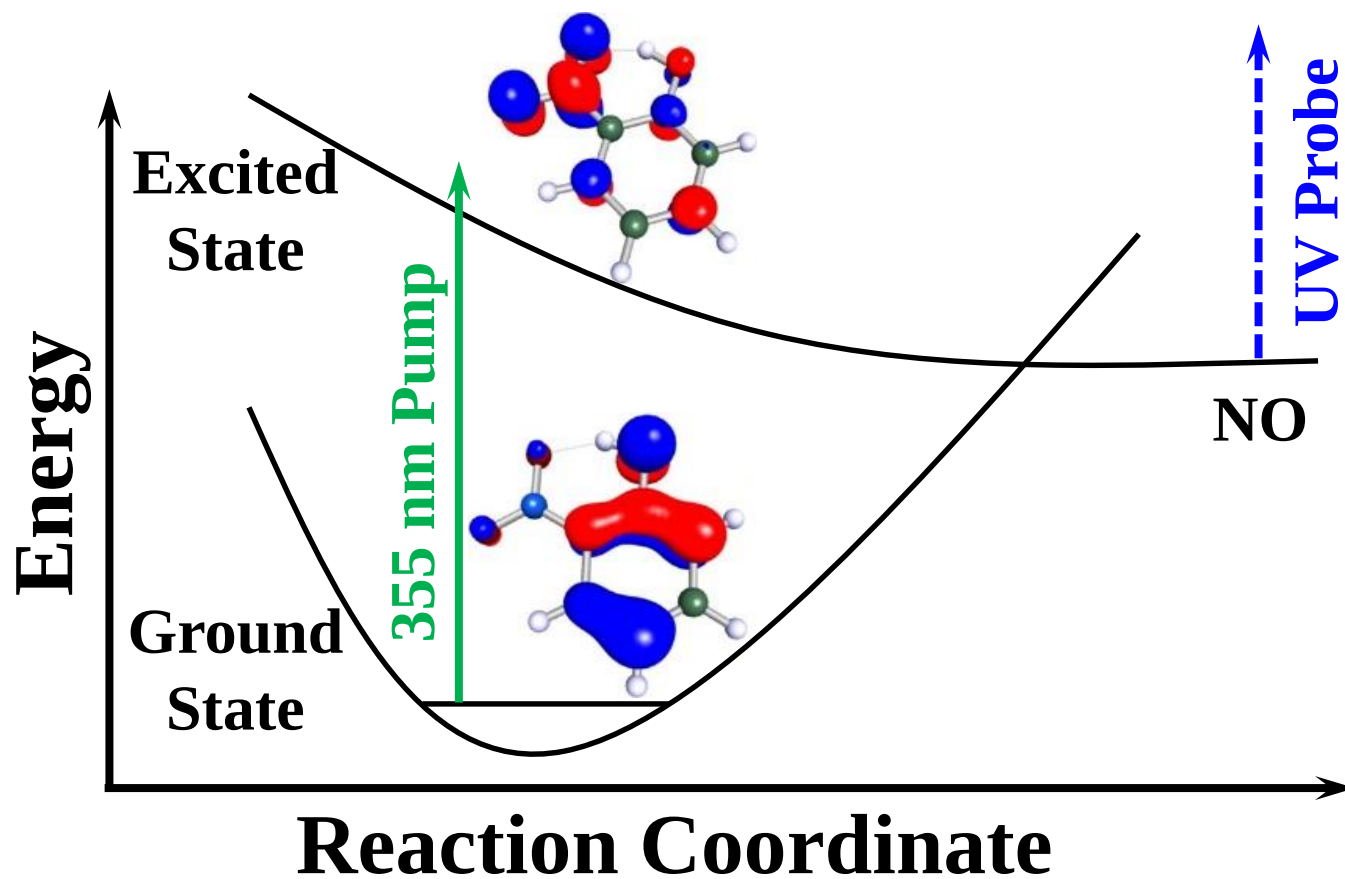
Nitrosalicylic Acids



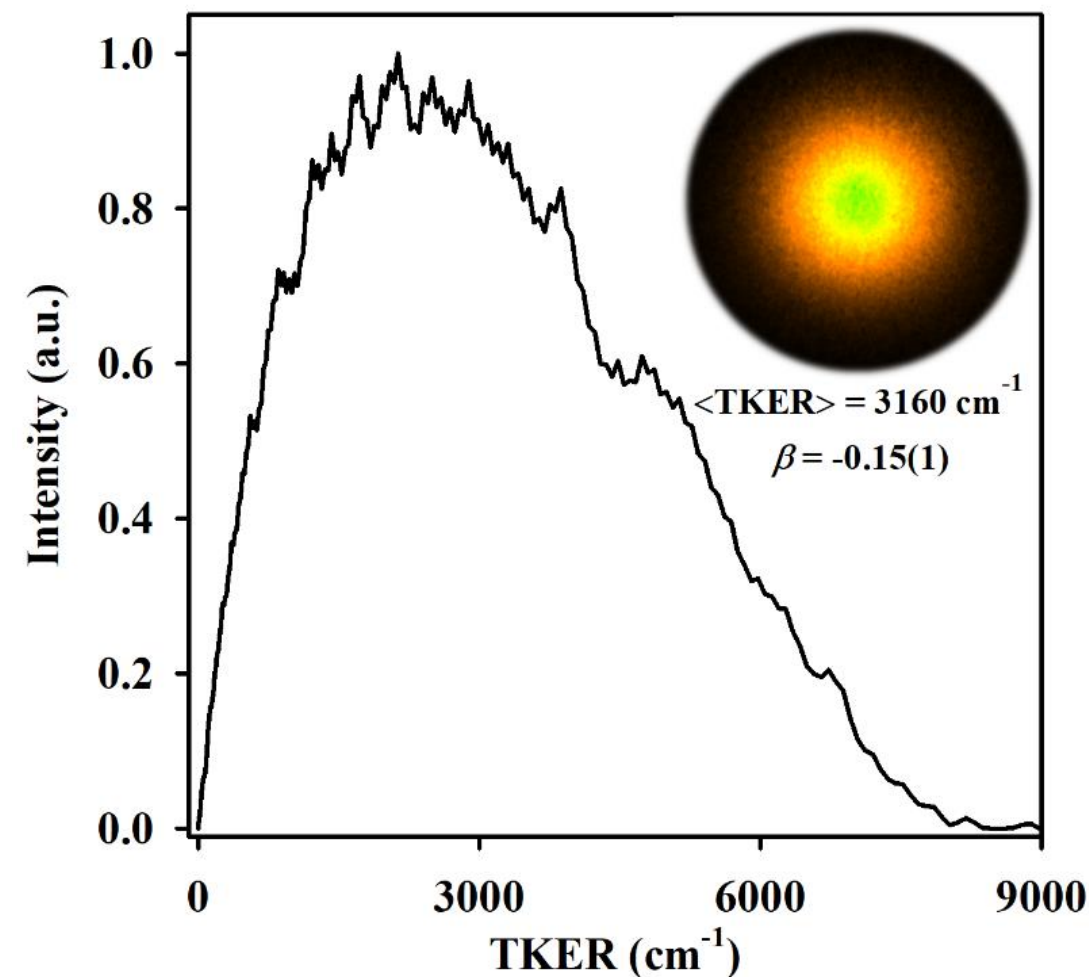
Many classes of BrC molecules with many isomers

Lin, P., *Phys. Chem. Chem. Phys.*, **2015**, 17, 23312

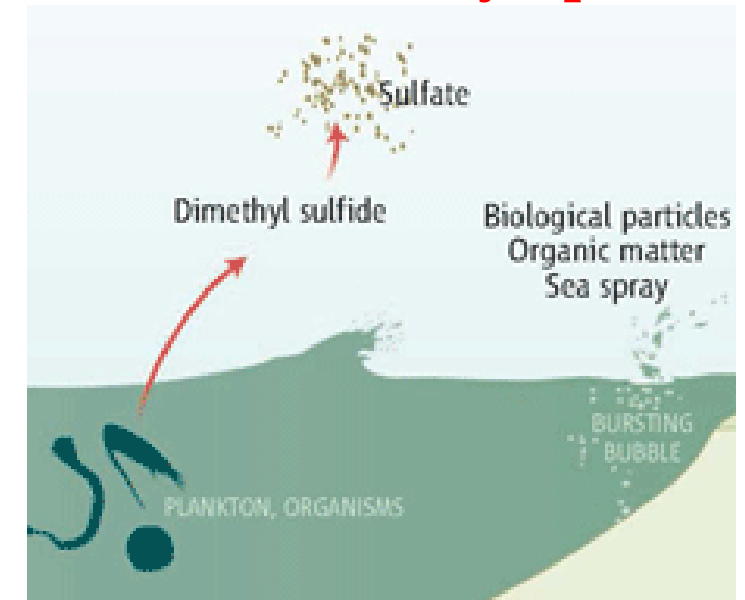
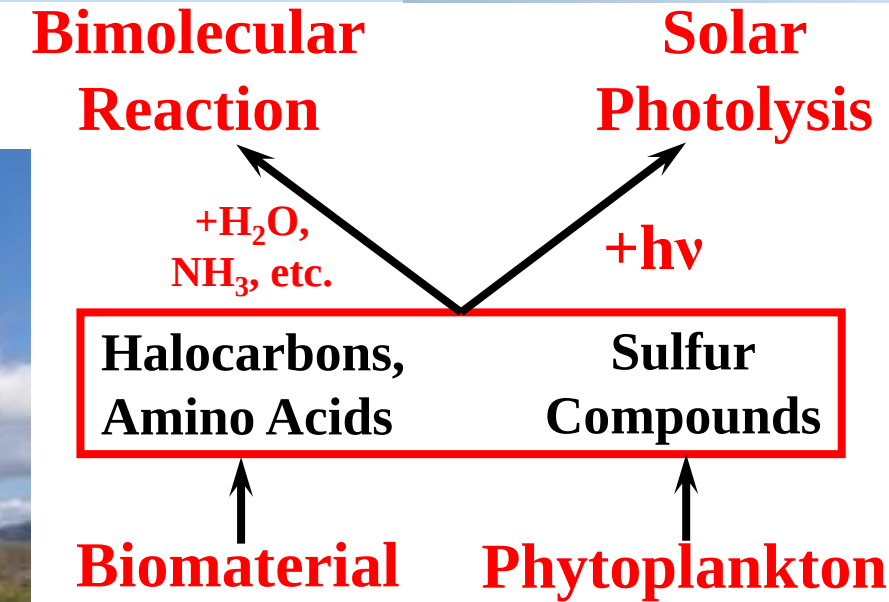
Near UV Photodissociation of Nitrophenols



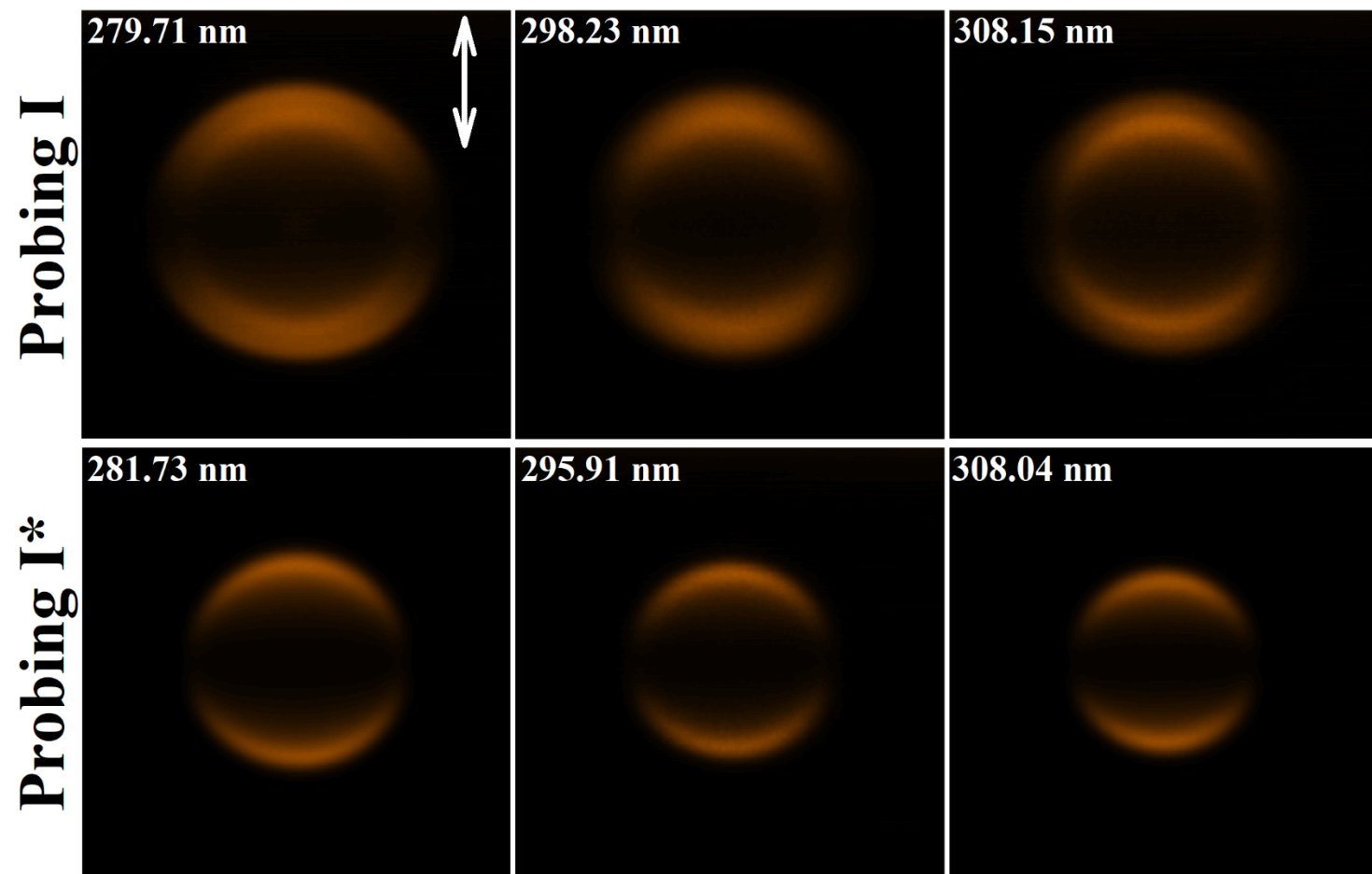
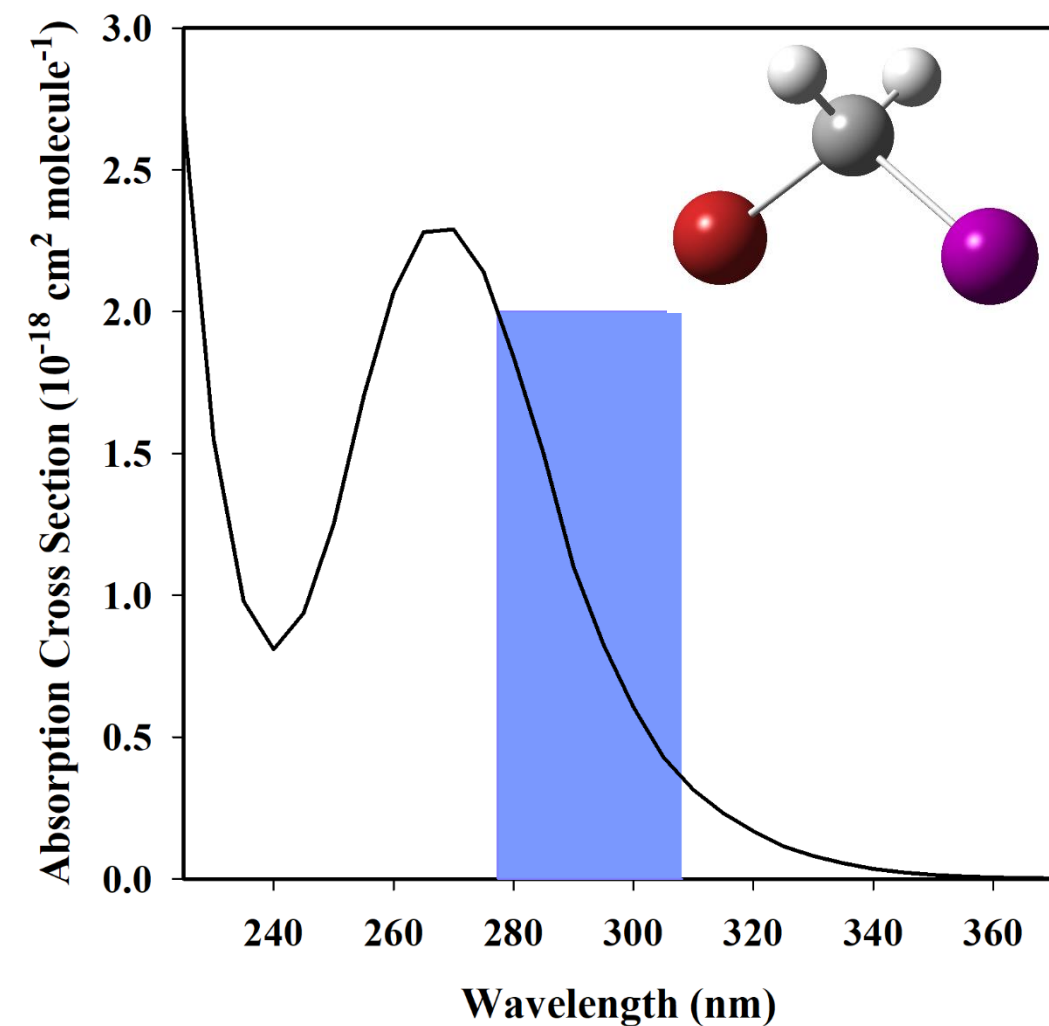
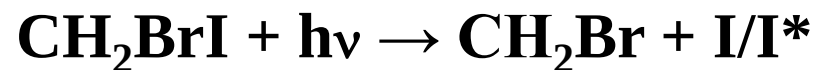
Probing NO $Q_1(30.5)$



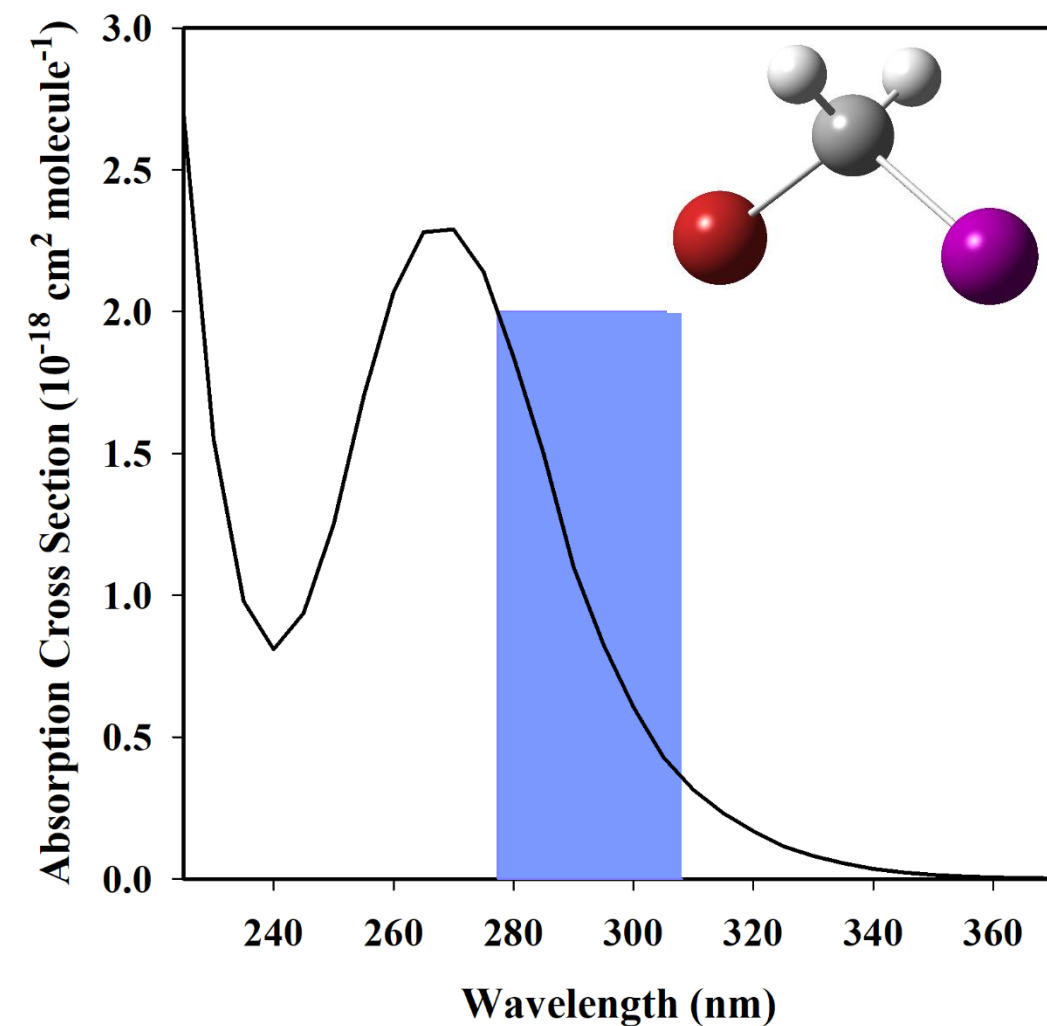
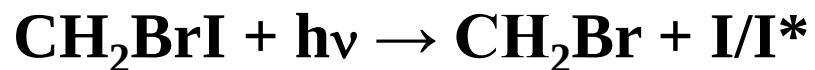
Biogenic Emissions from Oceans/Bodies of Water



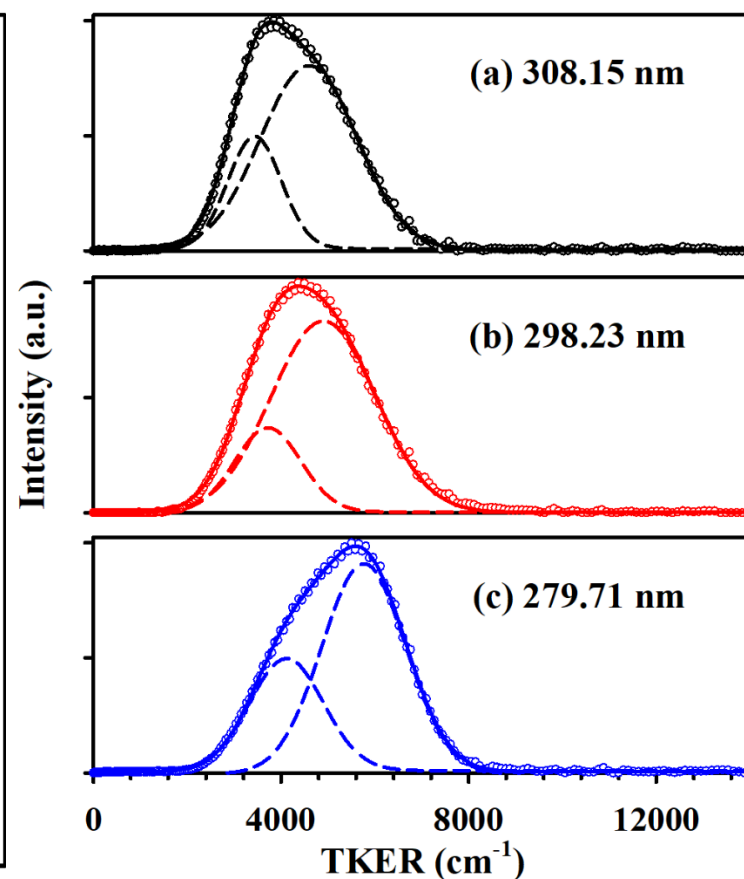
Ozone Depletion from Halocarbon Photochemistry



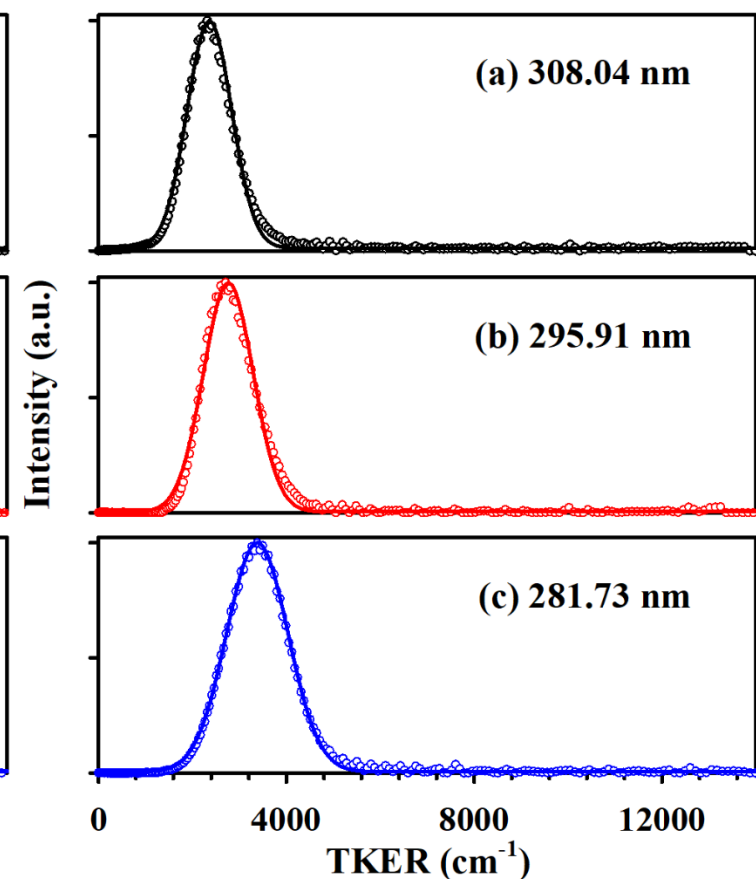
Ozone Depletion from Halocarbon Photochemistry



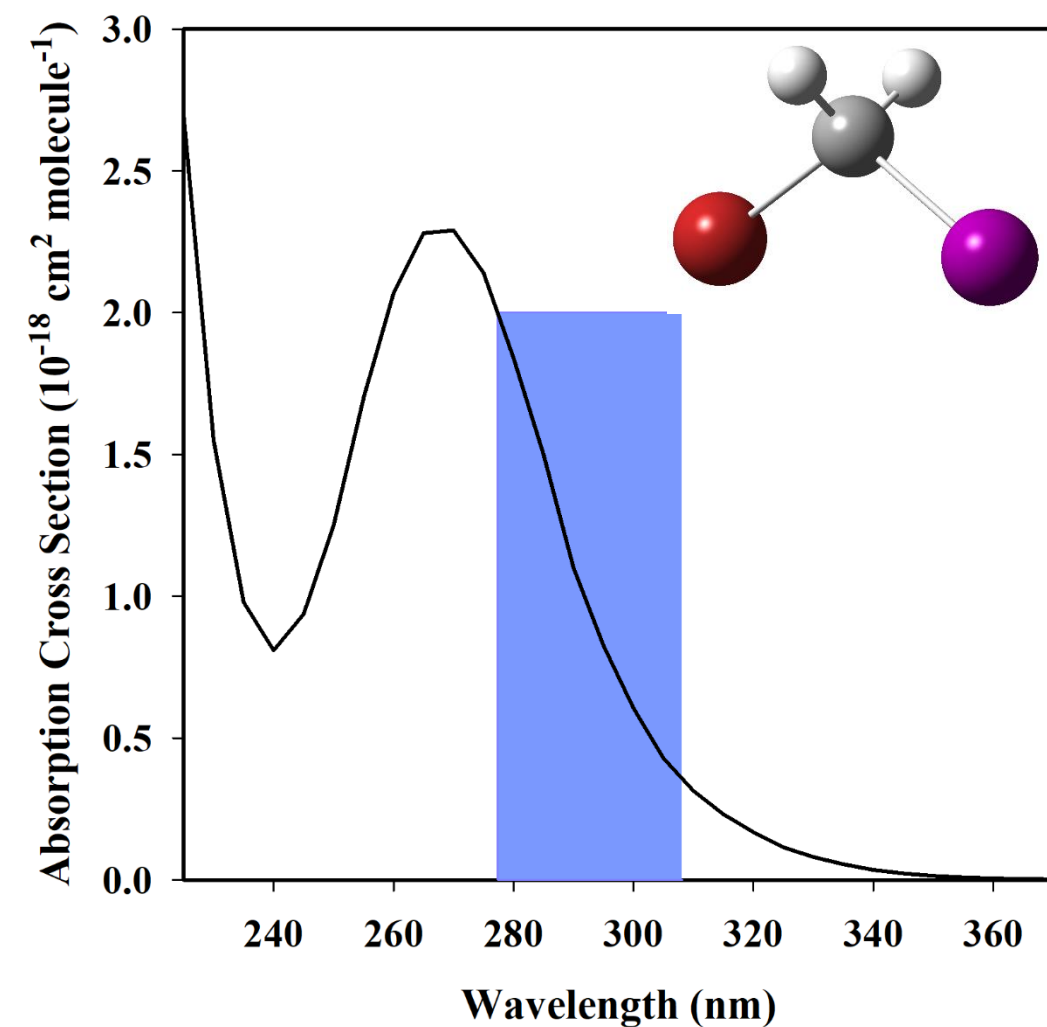
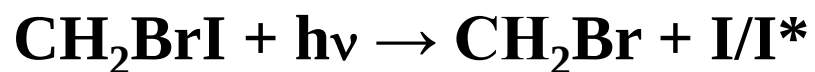
Probing I



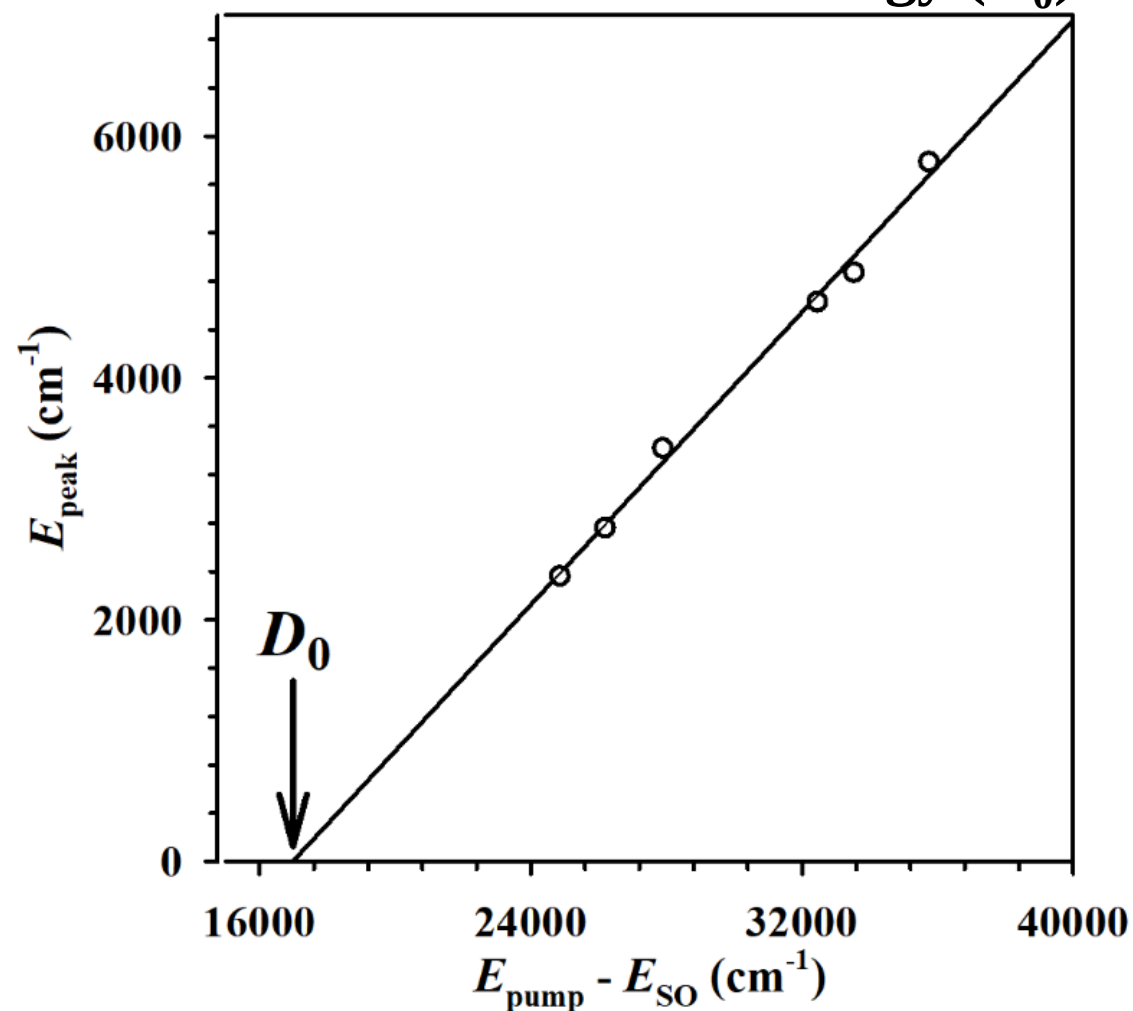
Probing I*



Ozone Depletion from Halocarbon Photochemistry



Determination of the Bond Dissociation Energy (D_0)

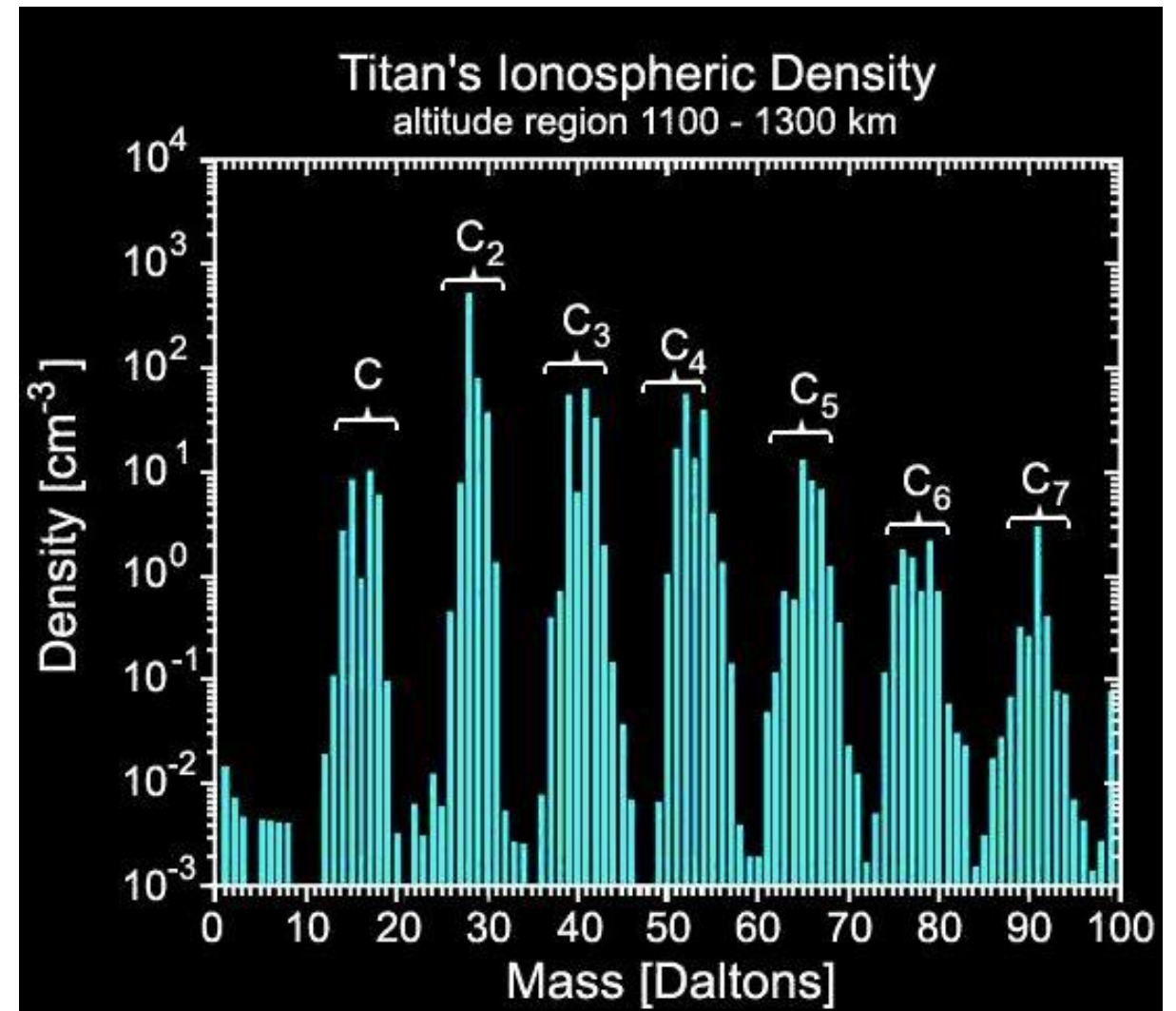
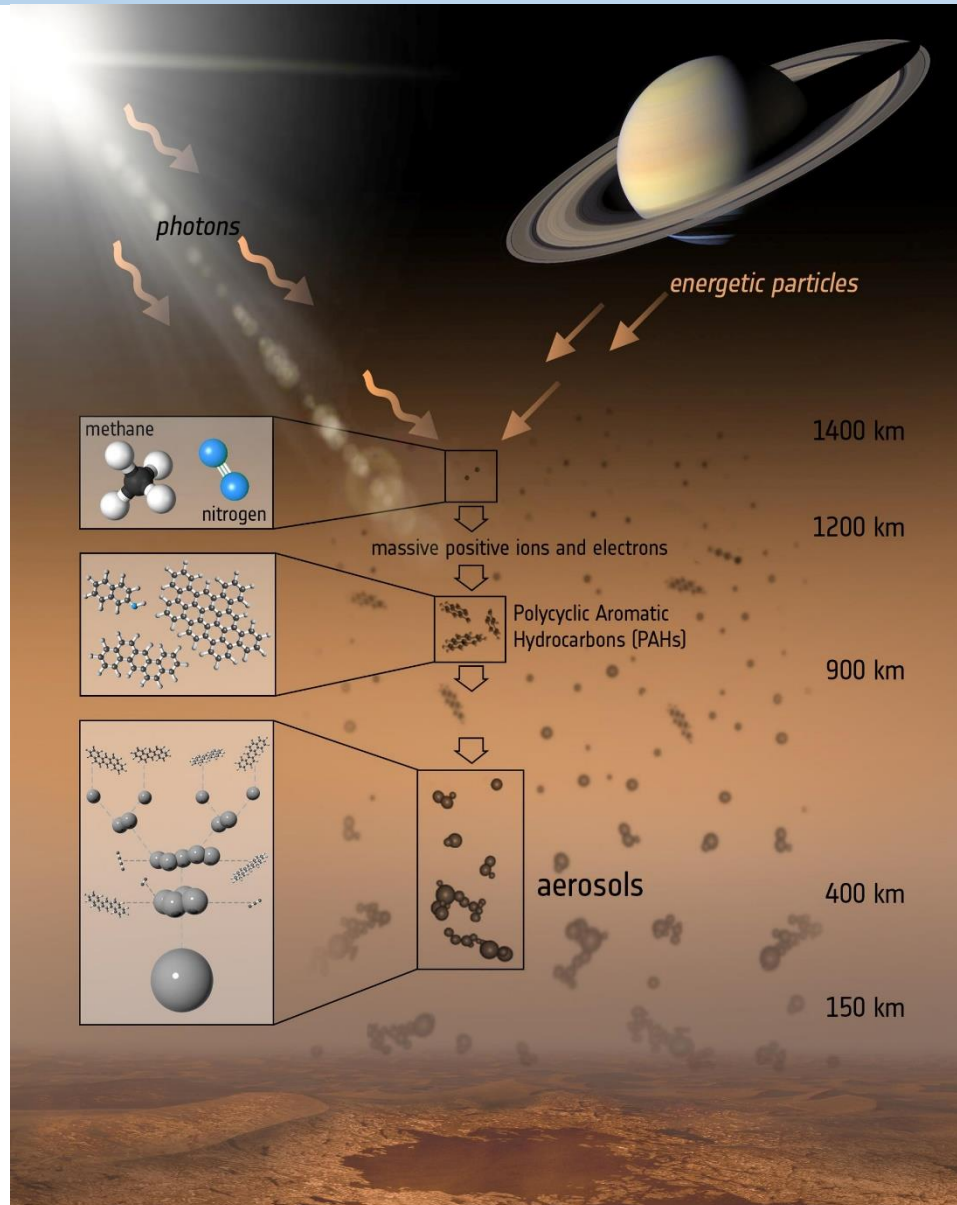


Planetary Atmospheres: Cassini's Grand Finale Sept. 15, 2017

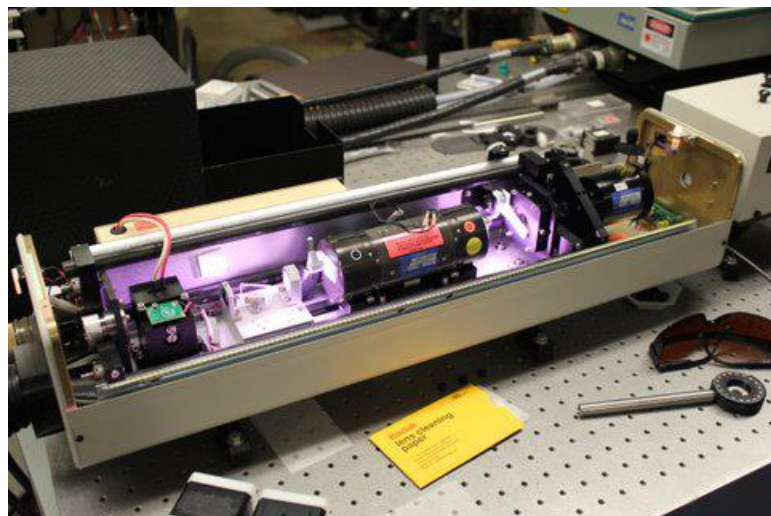


[nasa.gov](https://www.nasa.gov)

Planetary Atmospheres: Models for Earth's Atmosphere

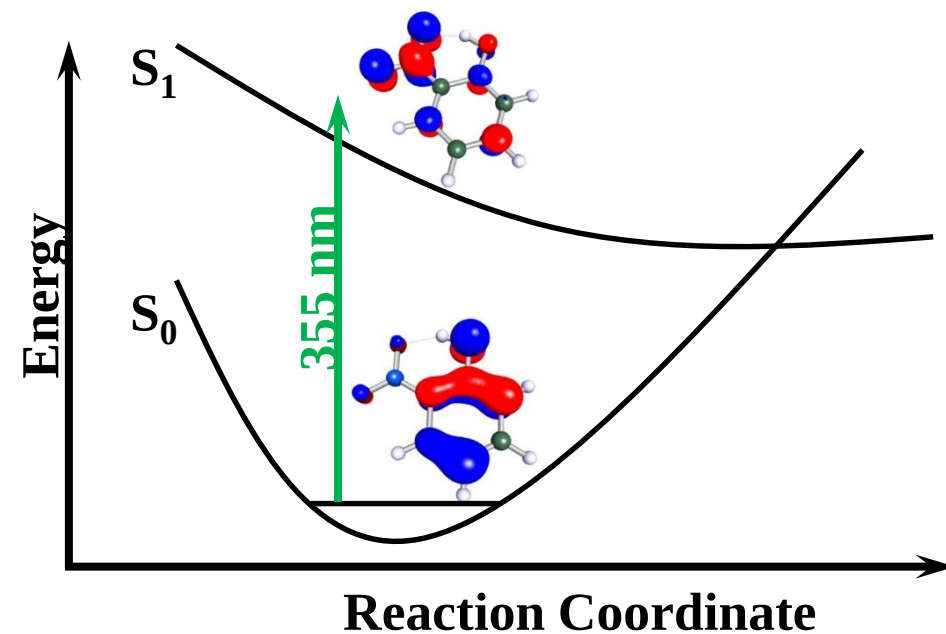
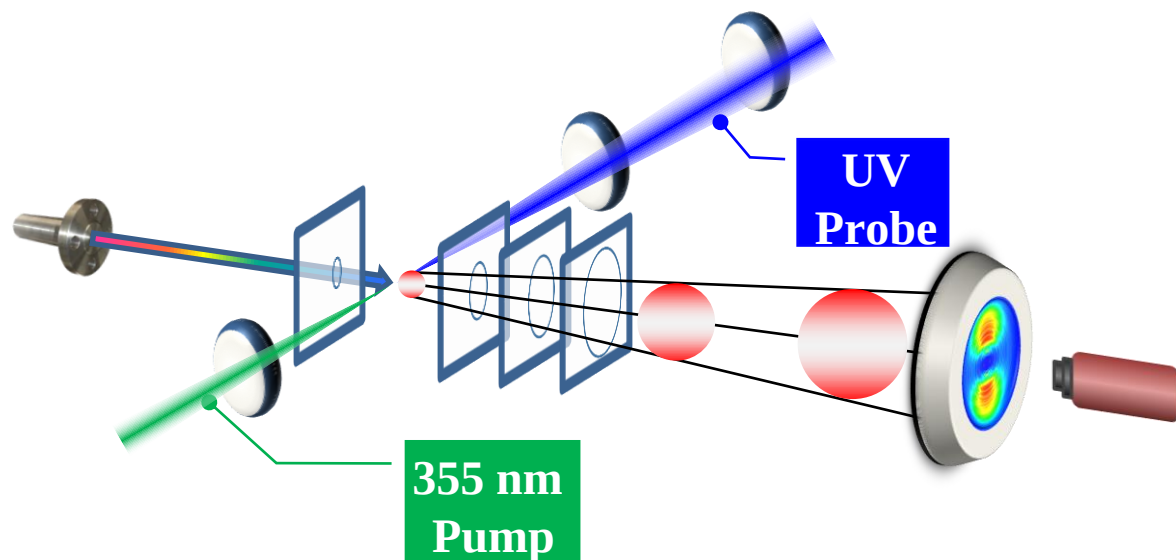


Student Research Activities & Involvement



Students will learn:

- Instrumentation building, troubleshooting
- Operate lasers and equipment to run experiments
- Computational chemistry and modeling



Currently 11 Students in the Group

- 1 Graduate Student: Jacob Blackshaw
- 6 Seniors: Annalise Ajmani, Changen Pan,
Wade Fritzeen, Sam Zhang,
Joseph Lee, Chandan Reddy
- 1 Junior: Robert Korb
- 2 Sophomores: Naa-Kwarley Quartey,
Sarah Chen
- 1 High School Student: Lehman Montgomery
- Interested in taking Freshmen,
Sophomores, or Juniors

