Selected ongoing work in the Sanders group
(9 topics juggled by 9 students)

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Continuation of work by Laura Kranendonk, now at ORNL
100 kHz thermometry – X. An, A. Caswell

\[
\begin{align*}
\phi &= 0.5 \\
\phi &= 0.44 \\
\phi &= 0.38 \\
\phi &= 0.31 \\
\phi &= 0.25 \\
\text{Motor} &
\end{align*}
\]
600 RPM

\[ T_{\text{intake}} = 148 \text{ C} \]

- Measured, 28 Averages
- Measured, No Averages
- Simulated (770 K, 17.2 bar)
100 kHz thermometry – X. An, A. Caswell

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**Pressure [bar]**

- Time [ms]: 0, 10, 20, 30, 40, 50
- Pressure: 0, 5, 10, 15, 20

**Temperature [K]**

- Temperature: 0, 5, 10, 15, 20
- Time: -90, -60, -30, 0, 30, 60, 90
- Thermal boundary layer arrives (?)

**Ideal Gas**

- \( T_{\text{intake}} = 148 \, \text{C} \)
- \( T_{\text{intake}} = 104 \, \text{C} \)

**Measured Temperatures**

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**Temperature Precision [%]**

- Piston Position [CAD aTDC]: -90, -60, -30, 0, 30, 60, 90
- Precision: -2, -1, 0, 1, 2
Continuation of work by Chris Hagen, now at Chevron
Fancy lasers – NASA / Air Force – T. Kraetschmer, D. Dagel
Also reference flames, shock tubes
UV absorption spectroscopy – DOE – R. Bartula

**Graph Description:**
- **Wavelength (nm):** Ranges from 308.0 to 309.5 nm.
- **Absorbance:** Ranges from 0.0 to 1.0.
- **Wavenumber (cm⁻¹):** Ranges from 32300 to 32450 cm⁻¹.

- **Conditions:**
  - Pressure (P): 1 atm
  - Temperature (T): 1550 K
  - Wavenumber resolution (Δν): 3 cm⁻¹
  - OH concentration (χ_OH): 0.01

- **Legend:**
  - Pink line: Simulation (HITRAN)
  - Blue line: Measurement (SHS)
FTIR sensing – Thermo Fisher Scientific – K. Rein
Optical Coherence Tomography – Honda – A. Witkiewicz
Upcoming work

- Raman imaging of gas temperature in engines
- Camera that takes pictures with high spectral content (>> RGB)
- Measurements of $\text{C}_2\text{H}_2$ as a soot precursor
- New applications of OCT in tissue
- Sensors for defense applications (toxic gases, ...)

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