Particulate Extinction Monitoring Using Cavity Attenuated Phase Shift Spectroscopy (CAPS)

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Cavity Attenuated Phase Shift

(Think Laser Cavity Ringdown)

No Laser

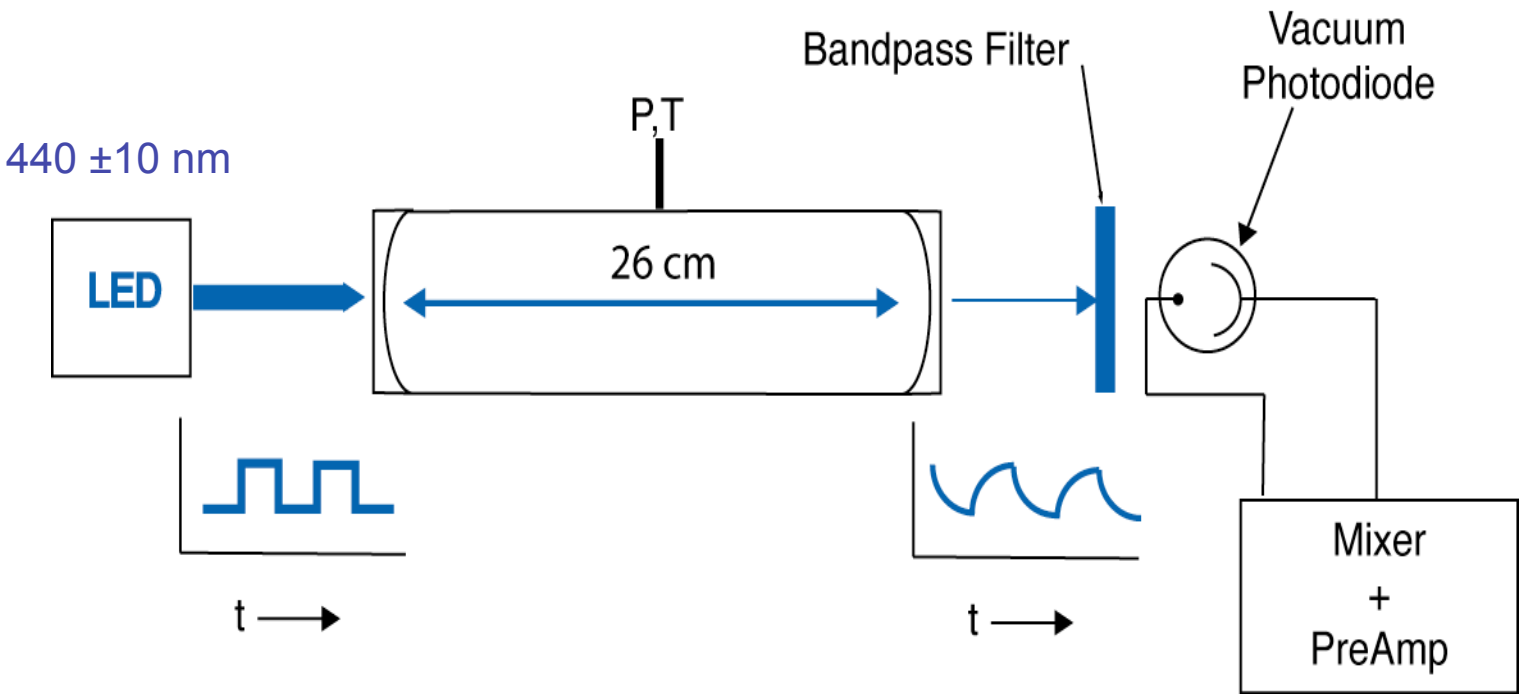
LED

- Inexpensive
- Choice of Wavelengths

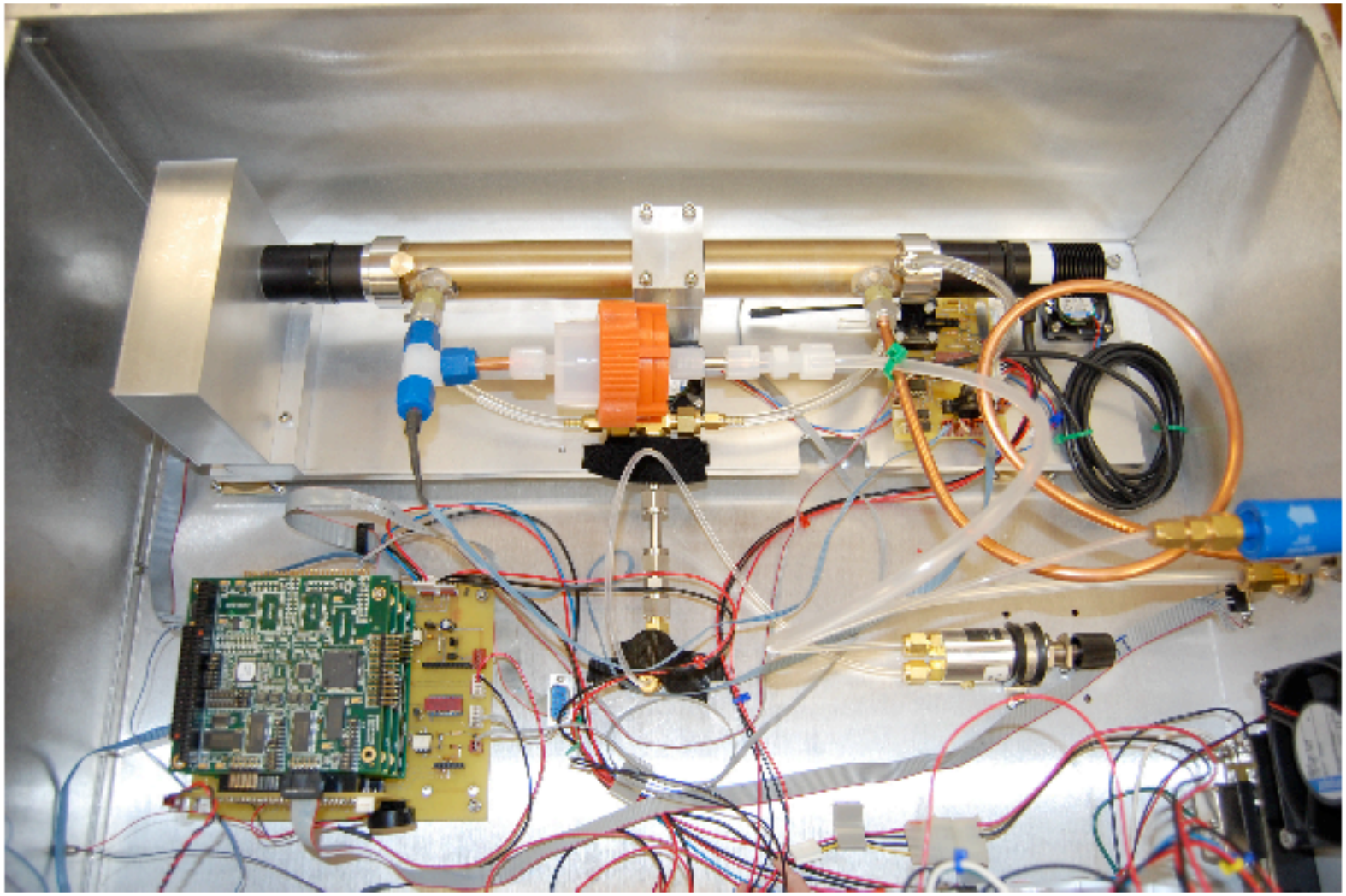
No Ringdown Measurement

Phase Shift

- Minimal Electronics
- Resolution ~ 20 ps

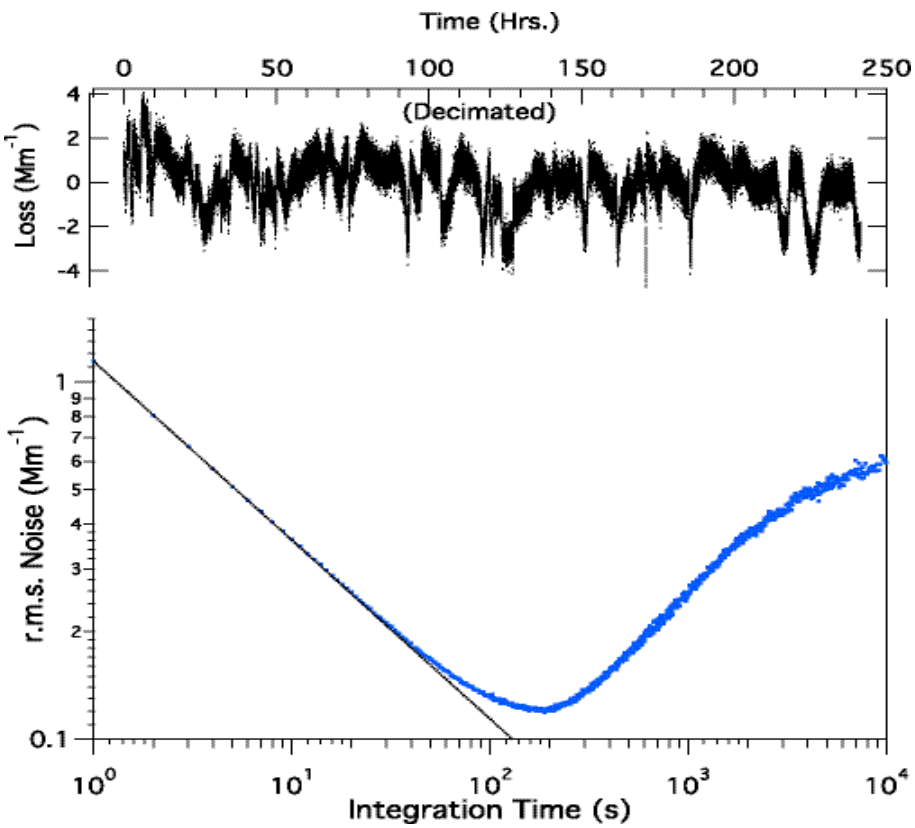


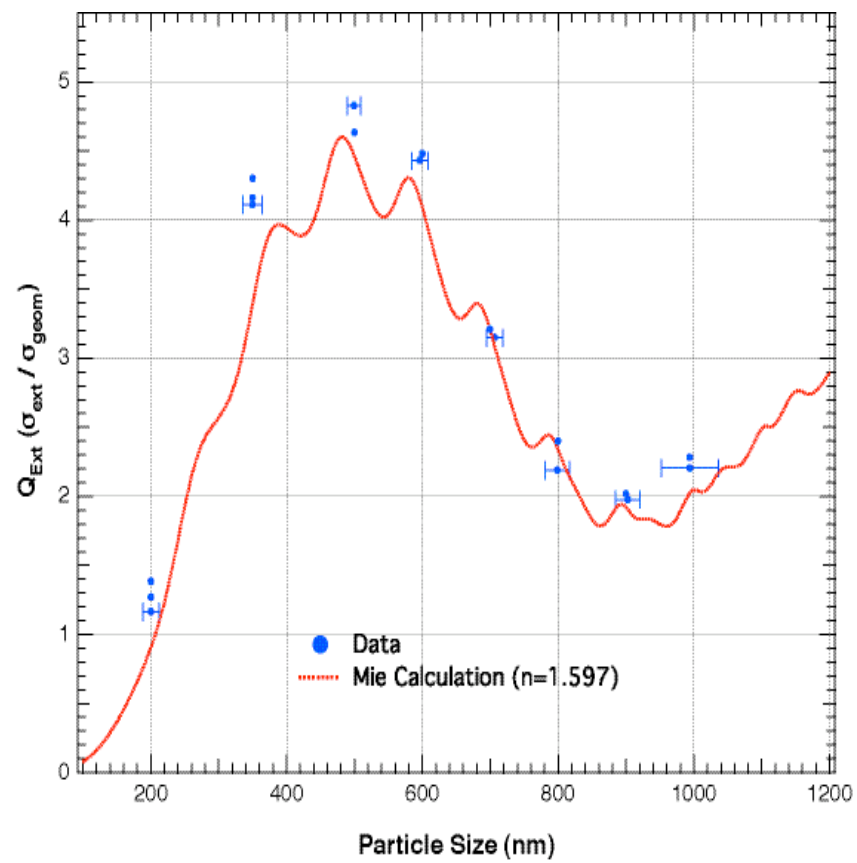
CAPS Extinction Monitor



Performance

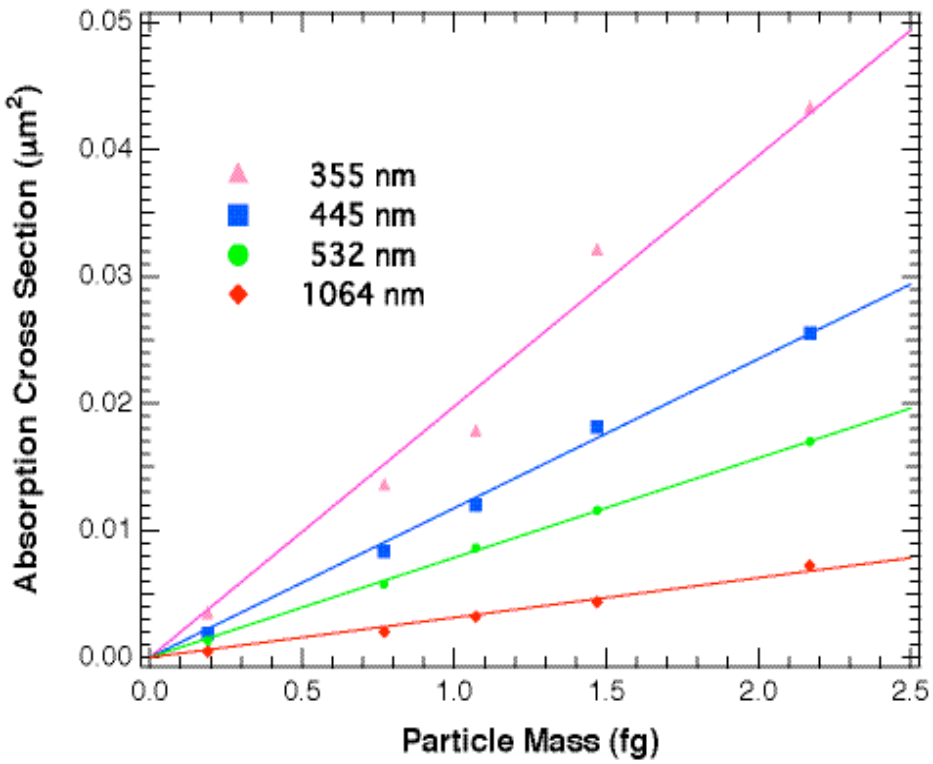
- Wavelength: 445 nm
- Time Response: 1 s (10-90%)
- Sensitivity ~1 Mm^{-1} (1 s)





Soot Extinction
(Absorption)

- Denuded Soot
  75-250 nm
- Compare to NOAA CRD
  355, 532, 1064 nm
  (P. Massoli, C. Cappa, D. Lack)
- Albedo Correction at 532 nm
  (NOAA PAS)
- Couette Centrifugal Mass Analyzer
  (J. Olfert, BNL)



Future Development

- RGB Version
  - Simultaneous Operation at 445, 525, 632 nm
  - Single Cell
- Single Scatter Albedo
  - Scattering Measurement
  - Single Wavelength
- Real Time Background Subtraction
  - 2nd Cell
- Small Cell Version (NASA)
  - 10 cm baselength