

# POPS

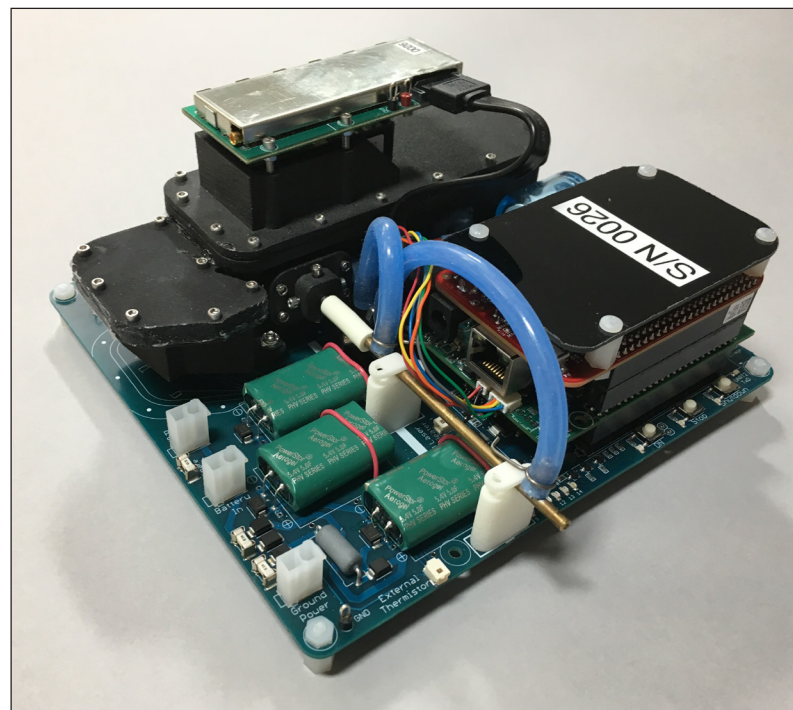
The Portable Optical Particle Spectrometer (POPS) is a light-weight, high-performance, and relatively low-cost particle counter. It is the ideal tool for measuring aerosol size distributions using unmanned platforms and ground-based sensor networks.

## Applications

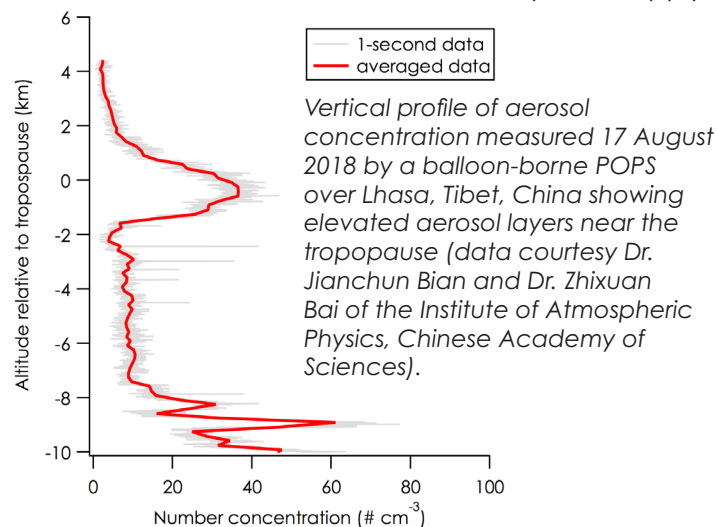
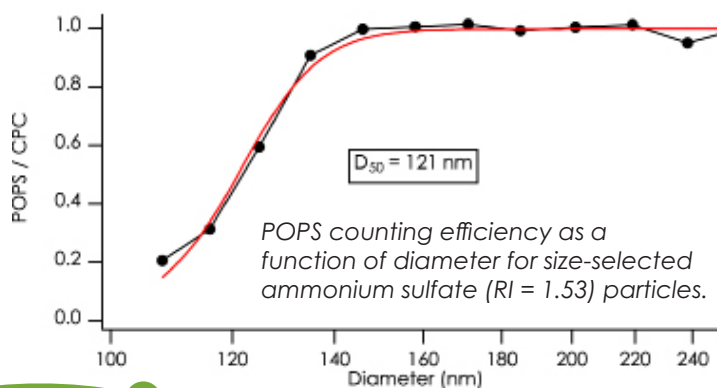
- Aerosol profiling on unmanned platforms such as radiosonde balloons, tethered balloons, and unmanned aerial vehicles (UAVs)
- Ambient environmental monitoring networks
- Work place monitoring
- Indoor air quality research
- Particle measurements in remote environments

## Features

- Diameter range: single particle in the diameter range 0.13 - 3  $\mu\text{m}$  in user-specified number of sizing channels
- Diameter resolution:  $\sim 5\%$  of diameter
- Adjustable flow rate for different concentration regimes
- Optional ground, airborne or modular enclosure packages to fit your measurement application
- Built-in data acquisition and logging capability



The POPS core system shown without optional enclosure or power supply.



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# Operation

Sample aerosol is drawn into the measurement region and surrounded by filtered sheath air. The sample flow is monitored using a laminar flow element and feedback controlled. Particles are illuminated by a 405 nm diode laser. Light scattered by the particle is focused onto a photomultiplier tube by a spherical mirror (38° - 142° collection angle). The intensity of the scattered light pulse is proportional to the diameter of the sampled particle. The POPS is calibrated using NIST traceable polystyrene latex spheres (PSL).

**Reference:**

Gao, R.S., et al., A light-weight, high-sensitivity particle spectrometer for PM2.5 aerosol measurements, *Aerosol Science and Technology* 50, 88-99, 2016.

Yu, P., et al., Efficient transport of tropospheric aerosol into the stratosphere via the Asian summer monsoon anticyclone, *PNAS*, 6972-6977, 2017.

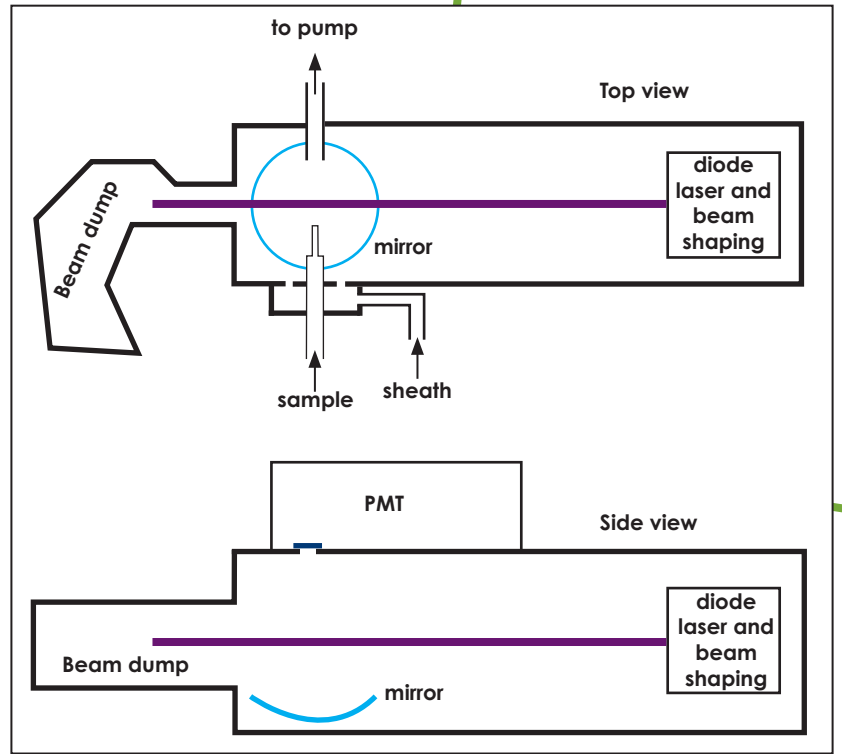


Diagram of the POPS measurement chamber.

# Specifications

**Particle Size Range**

Min. Detectable (D50)	130 nm
Max. Detectable	3.0 µm

**Particle Concentration Range**

Minimum limited by counting statistics  
 Max. with <10% coincidence error 1250 #/cm<sup>3</sup>  
 (for 0.1 LPM sample flow rate)

**Particle Concentration Accuracy**

+/- 10% < 1000 #/cm<sup>3</sup>  
 (for 0.1 LPM sample flow rate)

**Flow**

Min. Sample Flow Rate	0.05 LPM
Max. Sample Flow Rate	0.35 LPM

**Environmental Operating Conditions**

Min. Temperature	-40 C
Max. Temperature	+35 C
Ambient Humidity	0-95%, non-condensing

**Data Logging and Storage**

On-board 32 GB micro-SD.

**Laser**

Wavelength	405 nm
Power	~ 70 mW

**Logging Interval**

1 Hz

**Power Requirements**

DC power (AC adapter or battery)	+12VDC
Average power consumption	5 W

**Communications**

Ethernet Interface	8-wire, RJ-45, 10/100 BASE-T, TCP/IP
Serial	RS-232
USB (diagnostic mode)	USB

**Physical Dimensions**

Core system	175 x 162 x 88 mm
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**Weight**

Core system	600 g
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**Detector Geometry**

Collection angle	38°-142°
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Specifications subject to change without notice.

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