

# Aerosol and Particle Measurement Short Course

## 19-21 August 2024



## TSI Lab Descriptions

### Topic A – Aerosol Conditioning & Sampling

Obtaining accurate measurements of aerosol particles requires careful attention to how that aerosol is sampled and conditioned. “Sampling” pertains to the process of transporting the aerosol particles from their native location to the instruments that will measure them, and “conditioning” pertains to the process of getting the particles (and the air in which they’re suspended) ready for being drawn into the instruments so accurate measurements can be made. This lab will explore multiple best practices for each of sampling and conditioning; participants will be actively involved in setting up and conducting measurements. Once participants have explored both ‘sampling’ and ‘conditioning’, they’ll be introduced to a device used to handle both of these aspects for ambient air monitoring, to see an example of what an application-specific sampling system can look like.

### Topic B: Monitoring Submicrometer Particles

Submicron aerosol is an important area for aerosol-related work. While submicron aerosol can in some applications be rather stable in terms of size and concentration, it can also vary from minute to minute, or even second to second. For such ‘transient’ aerosols, specific measurement instruments must be used to obtain the highest quality data. This lab will explore how to measure such aerosols, in both a stationary setup, and in a mobile fashion. For mobile measurements, participants will use both sizing and counting instrumentation to measure particles in several environments within TSI. For stationary measurements, participants will challenge different instrument designs with several aerosol types, comparing not only the particle size distributions coming from those different challenge aerosols, but also the similarities and differences in the instruments’ response to a given challenge aerosol. Implications for experimental design will be discussed.

### Topic C: Supermicrometer Particles

This laboratory session will focus on the generation and size measurement of supermicron aerosol particles (i.e., those greater than about one micrometer). Two aerosol generators will be featured: a dust generator that creates polydisperse aerosol from powders, and a monodisperse aerosol generator (FMAG) that creates monodisperse particles from liquid solutions. The particles coming from these generators will be characterized by several different particle sizers, including the Aerodynamic Particle Sizer™ (APS™) and the Optical Particle Sizer (OPS). Measurements made by each of these instruments will be compared and discussed.

### Lab D: Filtration

Air filters are tested by generating particles and measuring concentrations upstream and downstream of a filter. The choice of particle type (material and size distribution) as well as detector type are major factors that influence the test results.

During this lab we will discuss a number of different sensors that can be used for testing air filters. We will feature several automated testers that use different aerosols, detectors, and other features to meet the needs of different filter testing applications.