



TRACER CONCENTRATION MEASUREMENTS

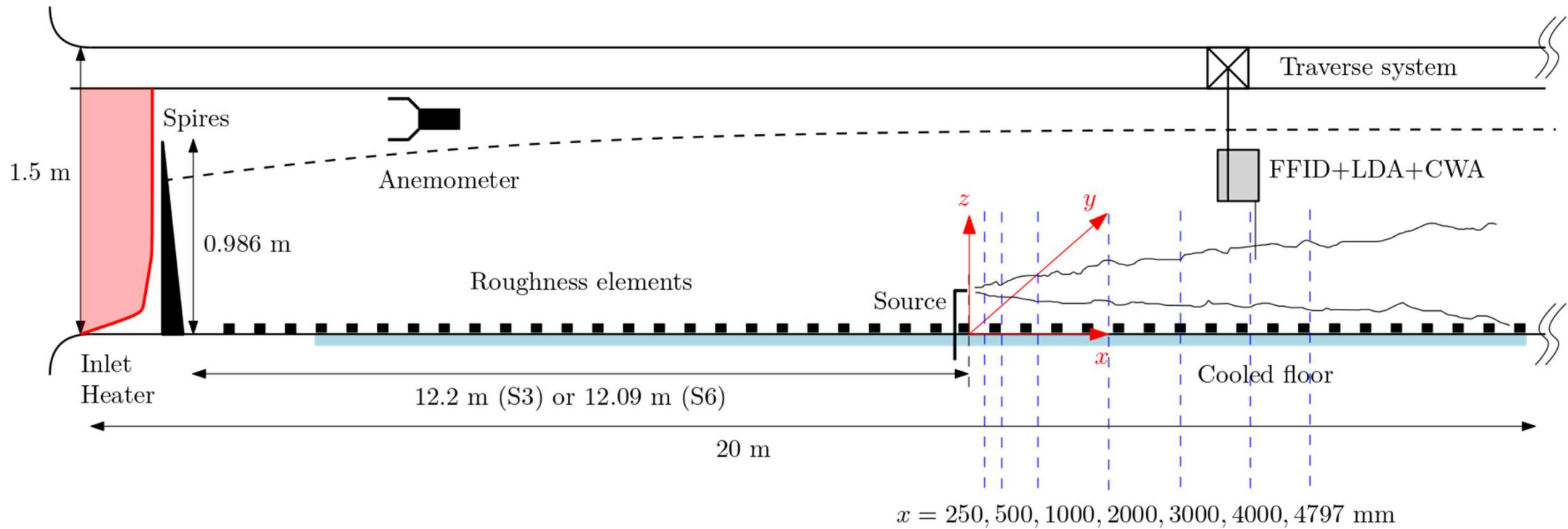
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OBJECTIVES

- Release a known quantity of tracer gas
- Measure mean and higher-order statistics of concentration
- Non-toxic, safe emission
- Emission timing control (e.g. continuous vs. “puff”)
- Buoyant (+ve or –ve) emissions



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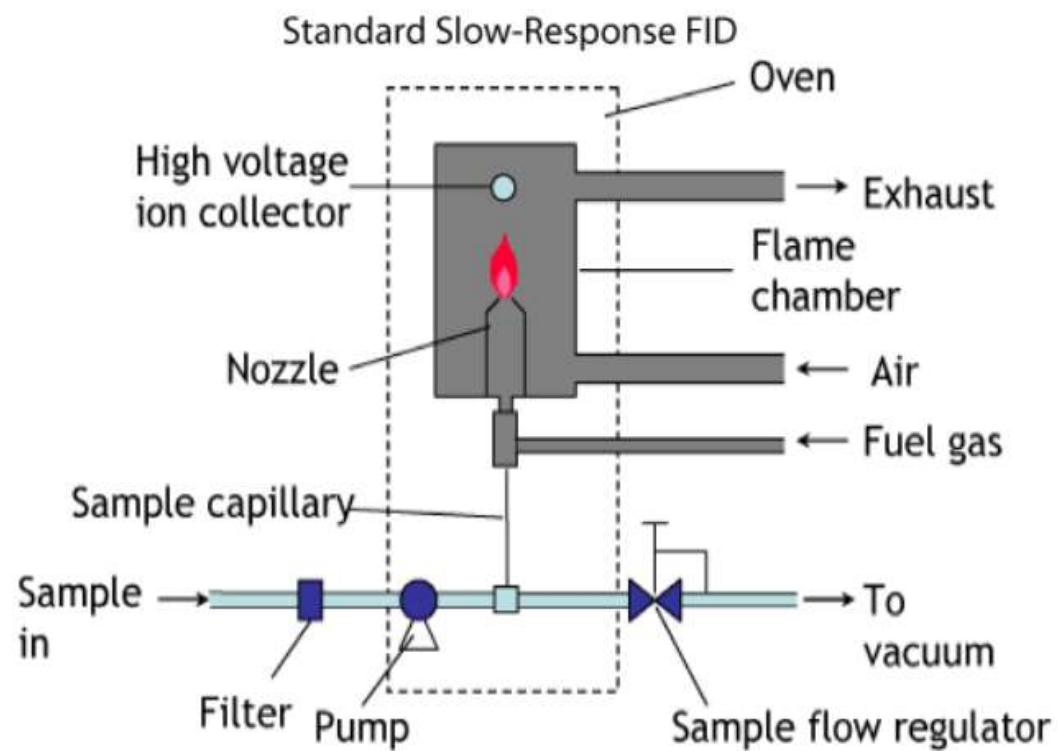


GAS MIXING SYSTEM

- Tracer gas: propane
- Carrier gas: air, helium or CO₂ (or 100% propane)
- Emit known quantity
- Continuous releases or “puffs”



FLAME IONISATION DETECTOR



FFID CALIBRATION



- Relationship between voltage and concentration depends on external conditions (e.g. temperature, pressure, etc...)
- Frequent calibrations are needed:
 - Release gases at known concentrations
 - Measure into the source
 - Repeat calibrations for long runs
 - Monitor calibration drifts
- Automation is necessary for long runs

BACKGROUND CONCENTRATIONS



- A “closed” open-circuit wind tunnel...
- Propane can accumulate in the lab over hours of continuous running (always to safe levels)
- Background concentration measurements are needed
- Interpolation & automation



SOLID-STATE CONCENTRATION SENSORS

