



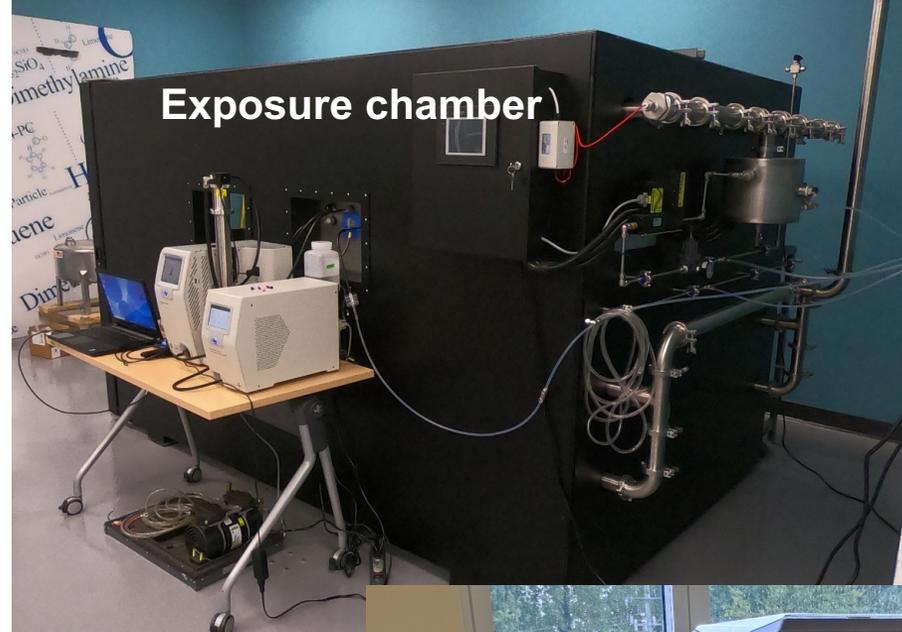
Particle Emissions from Fused Filament Fabrication 3D Printers and Their Impacts on Indoor Air Quality in School Environments

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Methods

- Chamber study (baseline data)
 - ANSI/CAN/UL 2904 method
 - Emission factor and exposure model
- Field study
 - K-12 school, university
 - Classroom, laboratory, maker center
 - Intervention strategies
- Measurements
 - Particle size distribution (10 nm to 10 μm)
 - Particle filter sampling ($\text{PM}_{2.5}$)
 - Environmental conditions (Temp, RH, CO_2 , air flow)
 - Volatile organic compounds sampling
 - Sample locations: near & far from printer, control room, hallway



Summary

- Fused filament fabrication 3D printing is a potential source of particle emission in school environments
- 3D printing could temporally elevate indoor particle concentrations in schools
- Near printer location could have higher concentrations, depending on air mixing and emission source
- Particle concentrations in a classroom without a 3D printer could be higher than one with ongoing 3D printing, due to other student/teacher activities
- Additional filtration system attached to a printer could reduce particle emissions