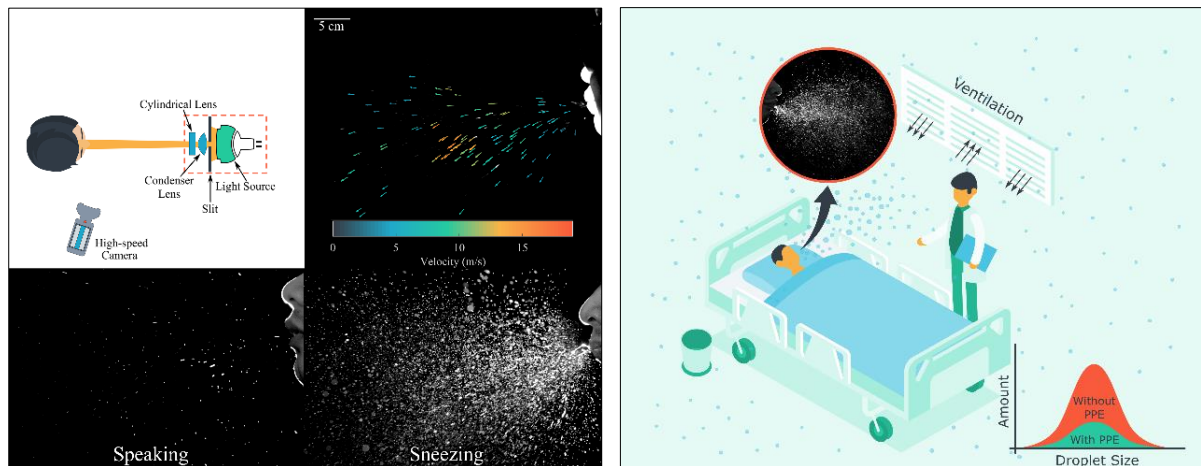


Examining droplet laden flows and ventilation



Various projects are available to examine droplet laden flows such as respiratory exhalations. The project will explore the spread of such droplets, their interaction with personal protective equipment (PPE) and the impact of different ventilation configurations. The project will utilise a dedicated aerosol testing laboratory to perform a variety of flow measurements. Further, these projects are supported by various industry partners, hence scholarship top-ups are available.

Background: Respiratory pathogen transmission happens predominantly by the droplets and aerosols generated during events such as exhalations, yet a clear fundamental understanding of the underlying flow physics of these multiphase droplet laden flows is not fully appreciated. Moreover, their complex interactions with personal protective equipment (PPE) and the effects induced by different environmental conditions remain elusive. Through utilising experimental methods complemented by numerical simulations to replicate and examine these flows we aim to address these knowledge gaps. The project will involve flow field measurements using particle image velocimetry and computational fluid dynamic work depending on the student's background.

Ideal candidate: It would be helpful if potential applicants were experienced in image analysis and have an interest in fluid dynamics. During this project, beyond developing critical thinking and project management skills you will be an expert in experimental fluid dynamics, data analysis and be exposed to CFD. The project will involve collaborations with Medicine / Kirby Institute at UNSW and other industry partners.

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Recent work from our group:

1. P. Bahl, C. de Silva, C. R. MacIntyre, S. Bhattacharjee, A. A. Chughtai, and C. Doolan, "Flow dynamics of droplets expelled during sneezing," *Phys. Fluids*, [2021]
2. C. M. de Silva, P. Bahl, C. Doolan, and C. Raina MacIntyre, "Bespoke flow experiments to capture the dynamics of coughs and sneezes," *Meas. Sci. Technol.*, [2021]
3. P. Bahl, C. M. de Silva, A. A. Chughtai, C. R. MacIntyre, and C. Doolan, "An experimental framework to capture the flow dynamics of droplets expelled by a sneeze," *Exp. Fluids*, [2020]
4. P. Bahl, C. Doolan, C. de Silva, A. A. Chughtai, L. Bourouiba, and C. R. MacIntyre, "Airborne or Droplet Precautions for Health Workers Treating Coronavirus Disease [2019]