

# 10'×5' Wind Tunnel

Department of Aeronautics  
Imperial College, London



Dr Kevin Gouder  
[kevin.gouder04@imperial.ac.uk](mailto:kevin.gouder04@imperial.ac.uk)



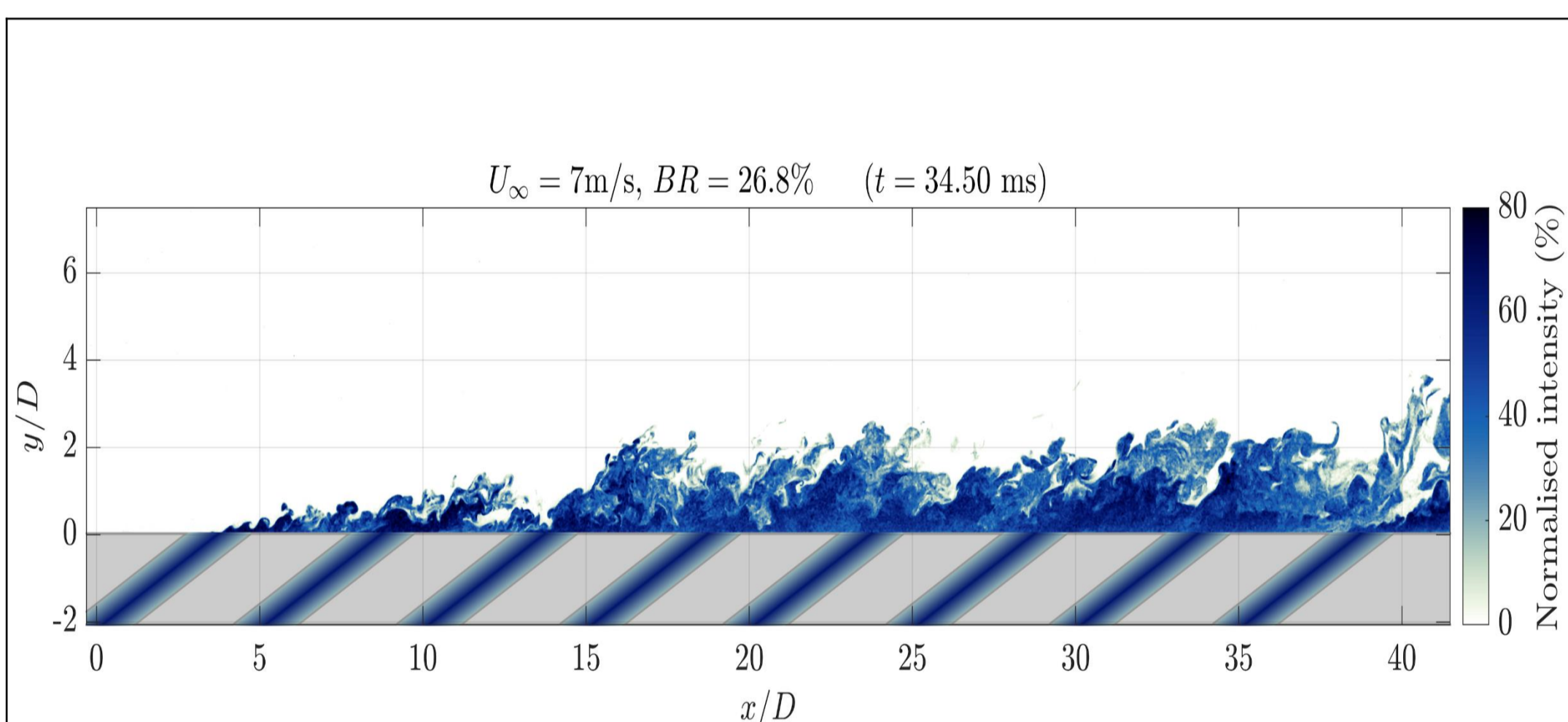
Dr Isabella Fumarola  
[isabella.fumarola12@imperial.ac.uk](mailto:isabella.fumarola12@imperial.ac.uk)



Prof Jonathan Morrison  
[j.morrison@imperial.ac.uk](mailto:j.morrison@imperial.ac.uk)

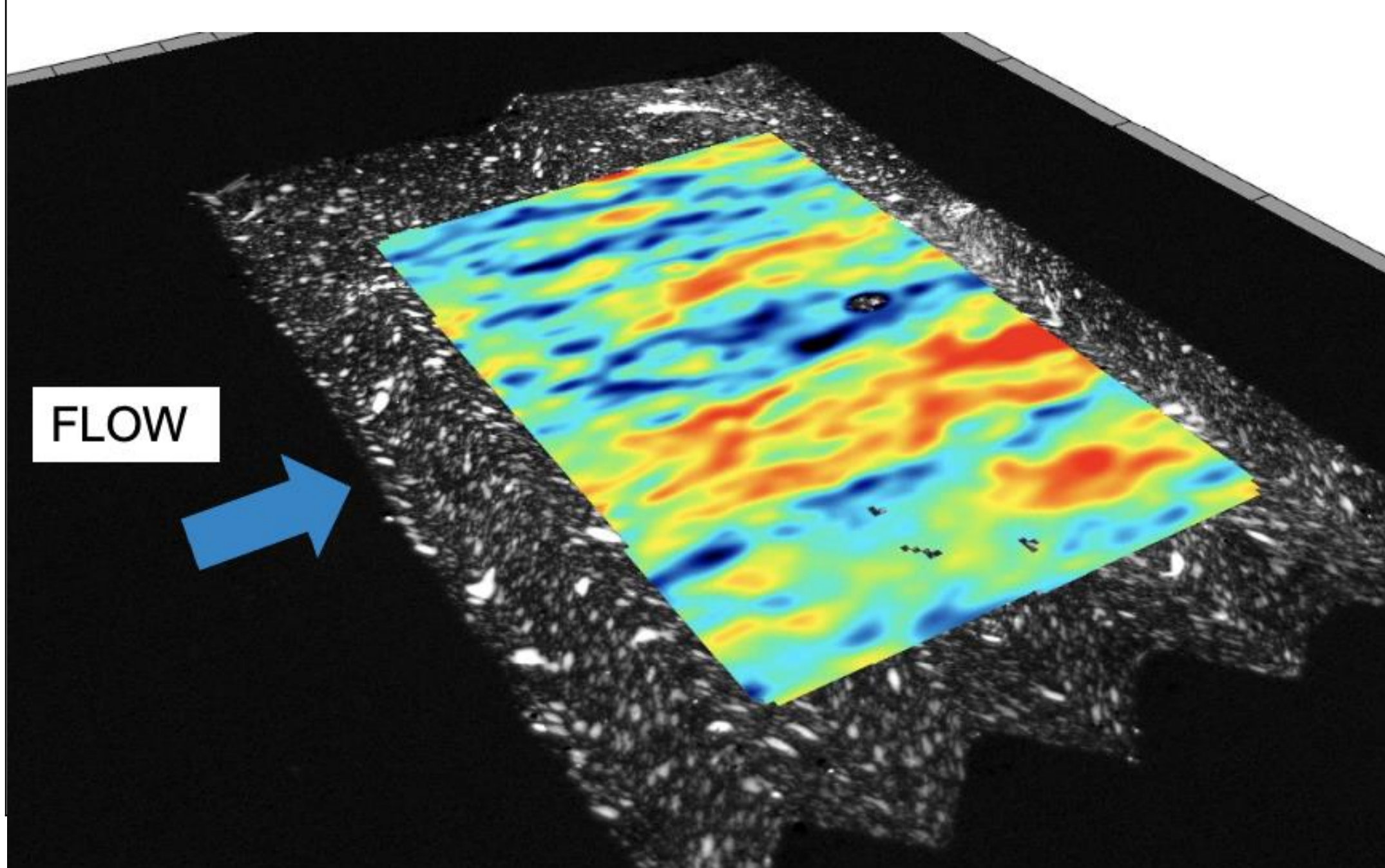


- Two test sections:
  - 3 m × 1.5 m × 20 m with a speed range up to 40 m/s, and Turbulence Intensity below 0.15%.
  - 5.8 m × 2.7 m × 18 m with a speed range up to 11 m/s.
- Temperature-controlled bulk flow.
- 360-degree turntable with integrated model elevator and stiff platform for high frequency force balance, underfloor aircraft model motion system, 6-axes underfloor balance, 6-axes strut-mounted internal balance, model wind turbine rig with torque and speed control, yawing rolling road for automotive, and for aircraft in ground proximity configurations, 512-channel pressure acquisition, high-speed PIV, Laser Doppler Anemometry, multi-hole probes, Constant Temperature Anemometry, dynamic section model rig, surface shear techniques, accelerometer array and a range of load cells.



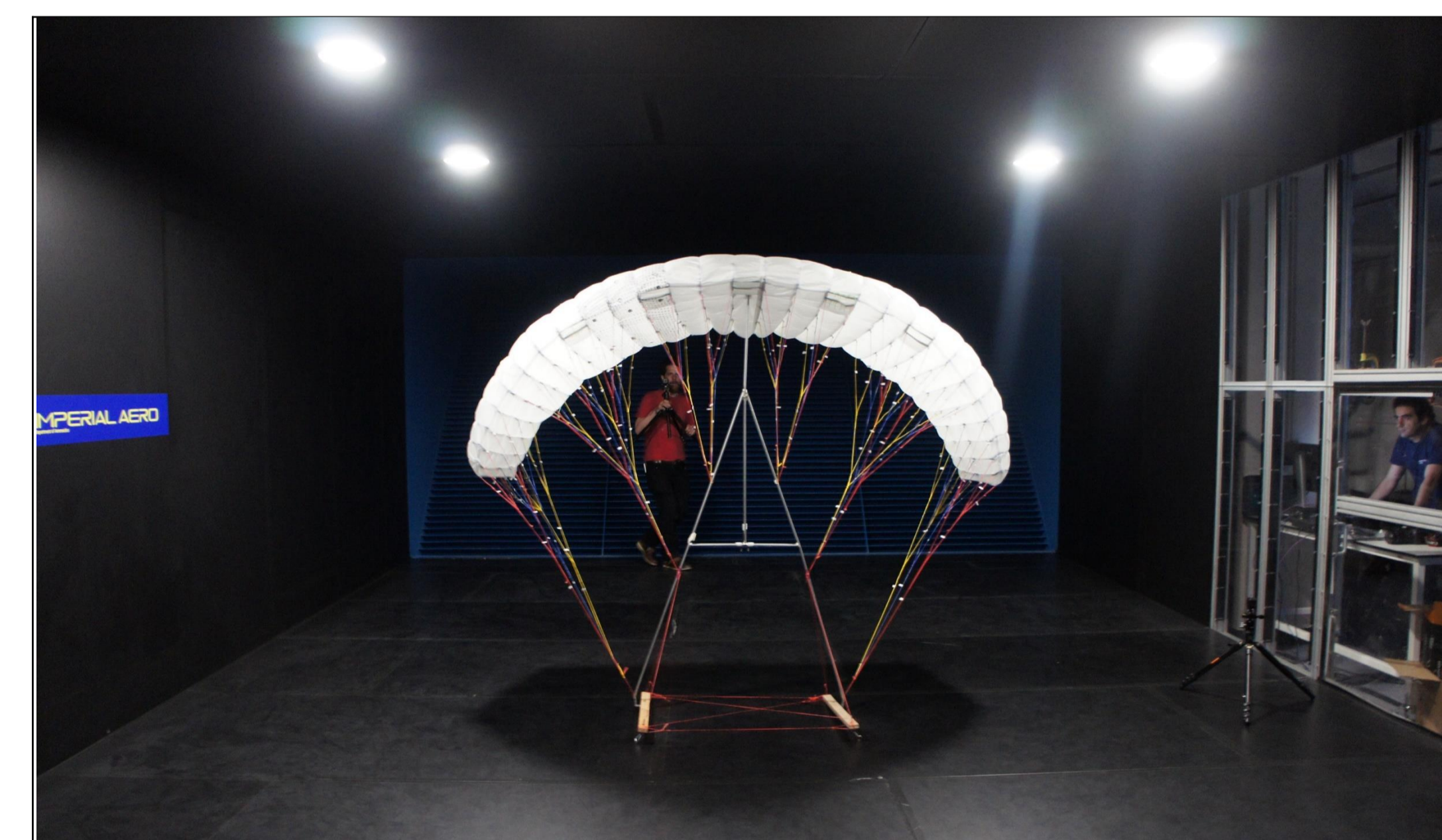
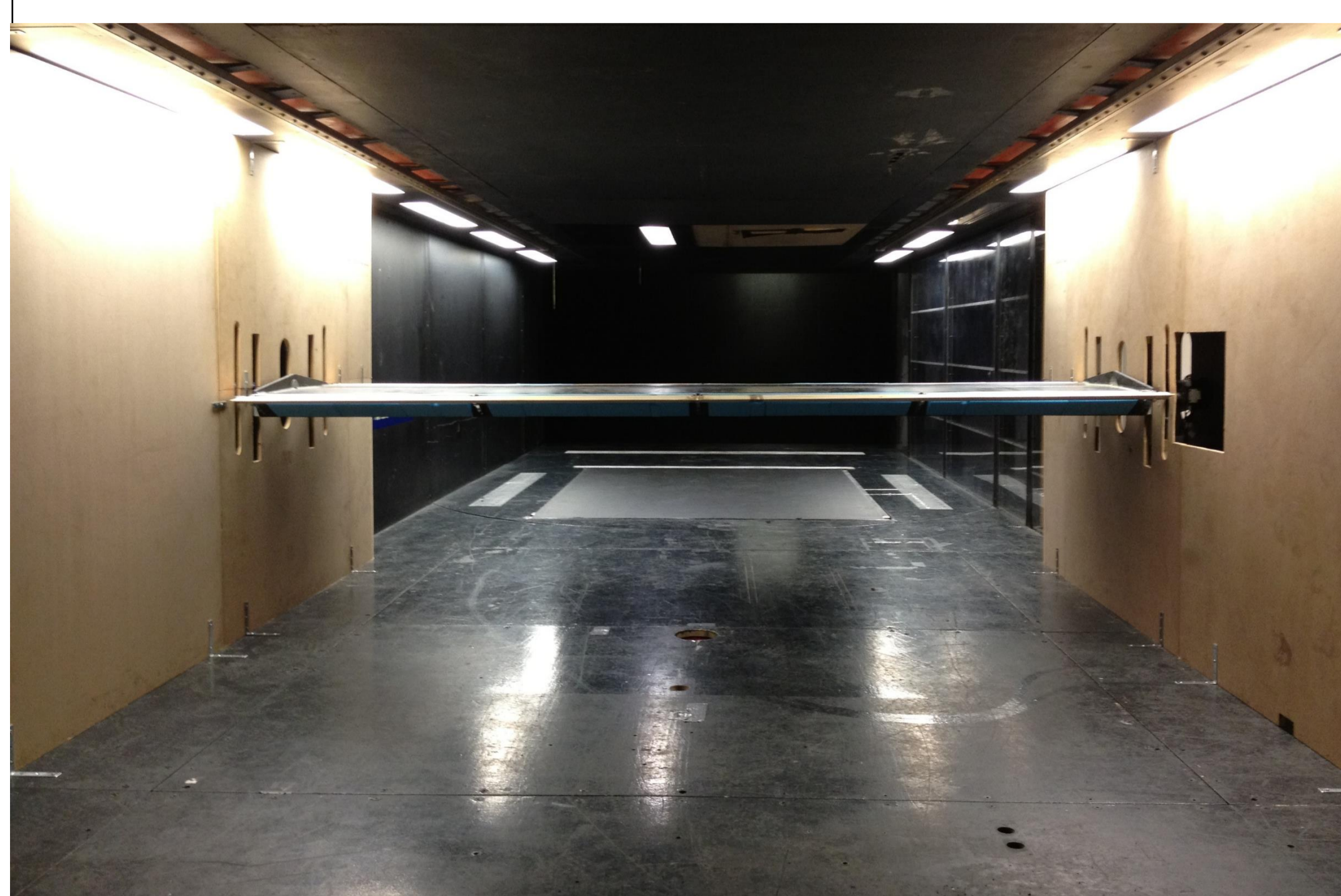
## Control of boundary layers

- Large, naturally-growing, boundary layers along the tunnel's long fetch are subjected to novel control techniques in fundamental studies.
- Above: injection of secondary flow into the boundary layer through porous floor in transpiration cooling experiments.
- Below: streamwise travelling surface waves using kagome lattices generates forcing that yields a significant friction drag reduction.



## Interaction of civil structures with Earth's Boundary Layer

- The long fetches enable the development of Atmospheric Boundary Layers.
- Dedicated rigs enable pedestrian safety and comfort, civil structure loading, and civil structure response.
- Research in mitigation and control techniques for urban resilience.



## Renewable Energy

- The size and fetch of the test sections enable the testing of model wind turbines, in isolation, or in mini wind-farm configurations, in realistic, scaled atmospheric boundary layers.
- Kinematic actuators mimic wave motion for floating turbines.
- The larger of the test sections enables scaled model testing of airborne tethered kites.

