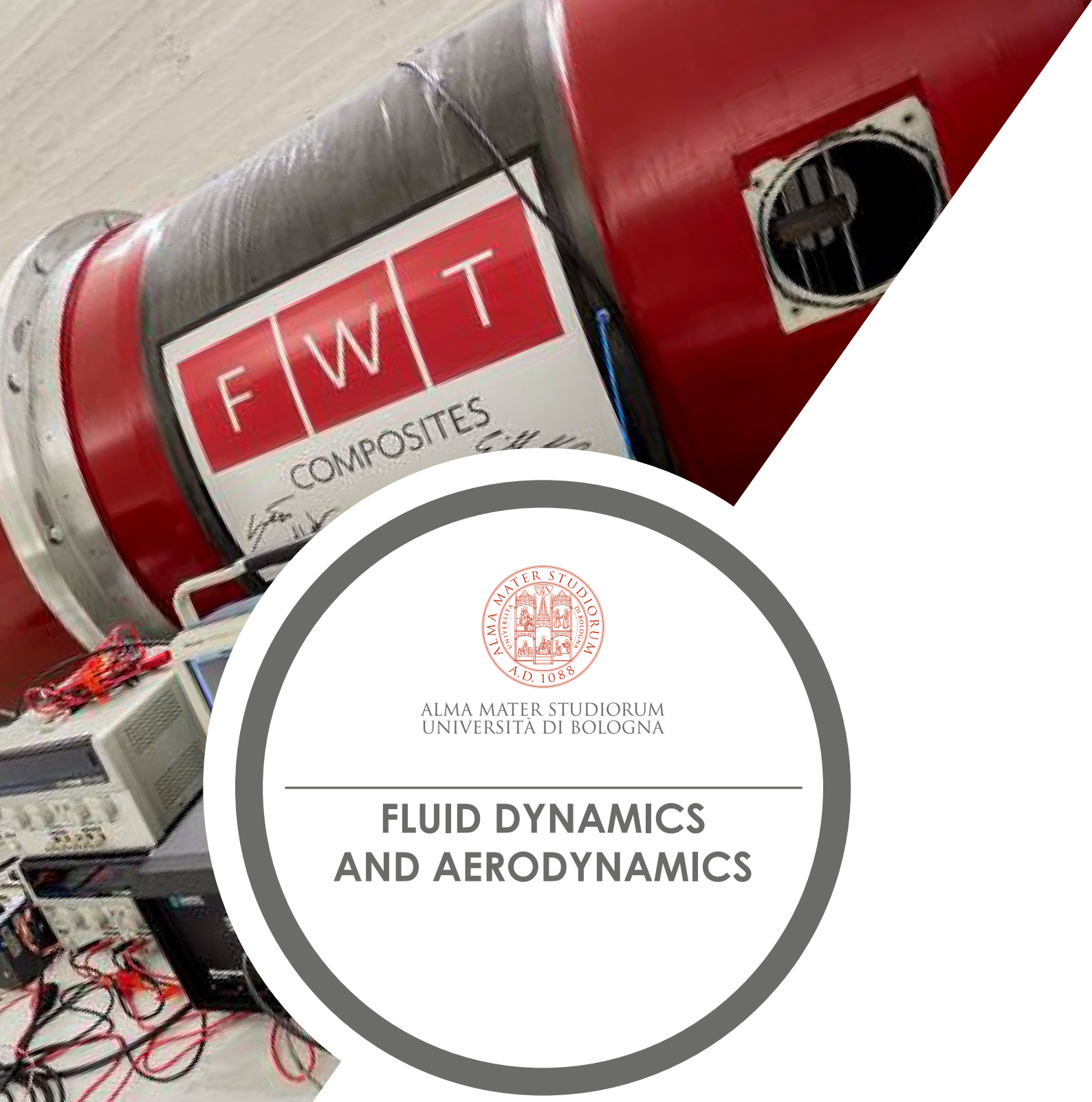

ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

FLUID DYNAMICS AND AERODYNAMICS

Efficiency is a parameter of fundamental importance in transport systems. In this respect the possibility to reduce and/or control aerodynamic drag has the potential to significantly reduce costs and emissions. The development of new and more accurate computational and experimental tools allows us to advance our understanding of basic physical turbulent processes and to develop passive and active control methods and new design tools.

Thanks to a world-leading experimental laboratory CICLoPE (Centre of International Cooperation in Long Pipe Experiments) located in Predappio, the University of Bologna attracts numerous international and multi-disciplinary collaborations. The outcome of this research is used to improve numerical models and to design innovative solutions for ground vehicles and aircrafts.
The University of Bologna issues:

- Measurement and assessment of fundamental parameters and scaling laws of turbulent boundary layers to validate and improve CFD numerical models
- Development and validation of control strategies for reducing skin-friction and drag
- Development and validation of new sensors and measurement techniques specific for aerospace applications
- Design of experimental facilities for aerodynamic test
- Development of new estimation and/or corrections methods to extract relevant information from incomplete aerodynamic measurements
- Development of new techniques for laminar-turbulent transition and separation control in boundary layers (roughness or plasma actuated wings)
- Direct Numerical Simulation and Large Eddy simulations of Turbulent flows
- Turbulence modulation and control
- CFD analysis of ground vehicles

HIGHLIGHTS

The ***Long Pipe*** **CICLoPE** located in the tunnels of former Caproni's industries in Predappio is a unique **large-scale** pipe flow experimentthat allows **fully-resolved** measurements of wall-turbulence at high-Reynolds number. Is one of the key infrastructures of the European consortium Eu-HIT.
The Applied Aerodynamic laboratory includes an open loop wind tunnel and a jet facility used to develop and validate innovative aerodynamic components for ground vehicles and aircrafts, and includes collaborations with numerous industries.

Wind tunnel design and support to manufacturing

Design of wind tunnels or apparatus for experimental analysis in fluids mechanics, customized following specifications and requirements provided by the commissioner. The research group provides the aerodynamic and detailed design and may support the construction phase and the following set-up of the apparatus.

Dual Degree with KTH- Royal Institute of Technology of Stockholm: an integrated study programme providing exchange of students for one academic year, granting a degree as equivalent of a 2nd cycle Degree. Students benefit from financial aid provided by the Erasmus+ mobility programme 2018-19.