Speaker: **Michele Dolce** (EPFL, Lausanne)

Title: *A viscous vortex dipole and observations on viscous vortex crystals*

Summary: The evolution of point vortices in a 2D inviscid fluid is described by the Helmholtz-Kirchhoff system, which admits numerous relative equilibria in specific configurations. However, at large but finite Reynolds numbers, vortex core sizes increase due to diffusion, making the point vortex approximation unjustified over long times. Focusing on two counter-rotating vortices, I present a systematic asymptotic expansion that incorporates streamline deformation due to vortex interactions, aiming to quantify finite-size effects on the dipoles translation speed. The exact solution remains close to our approximation over a very long time interval that grows unboundedly as the Reynolds number increases. The proof relies on energy estimates inspired from the Arnolds variational characterization of the steady states of the 2D Euler equation, as recently revised by Gallay and Šverák for viscous fluids as well. For vortex crystals, I will discuss some intriguing physical features captured by the approximate solution. The work on the dipole was done with T. Gallay, while the study of vortex crystals is an ongoing collaboration with M. Donati.