Abstract: The dynamics of an inviscid and incompressible fluid flow on a Riemannian manifold are governed by the Euler equations. Recently, Tao launched a programme to address the global existence problem, not only for Euler equations, but also for their viscid counterpart, the Navier-Stokes equations, based on the concept of universality. This notion concerns the Euler equations without fixing neither the ambient manifold nor the metric, and can be defined as the property that any smooth non-autonomous flow on a manifold N may be 'extended' to a solution of the Euler equations for some (M,g) , where the dimension of M is usually much bigger than the dimension of N .

In this talk we will show the universality of the Euler equations using stationary solutions, which model fluid flows in equilibrium. While at first glance it seems that the steady Euler flows are too restrictive to encode aritrarily complicated dynamics, we shall see that the connection between the Euler equations and contact topology, allows us to import the flexibility principles from the contact realm to show that the stationary solutions exhibit universality features.

This is joint work with Robert Cardona, Daniel Peralta-Salas and Fran Presas (arXiv:1911.01963)