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Manuel del Pino is a Chilean mathematician, specialist in asymptotic patterns in nonlinear elliptic and parabolic PDEs. After obtaining his Ph.D. at the University of Minnesota he held postdoctoral positions at the Institute of Advanced Study and the University of Chicago. he became a professor at Universidad de Chile in 2002. In 2010 he was an invited speaker at the ICM Congress in Hyderabad and became a member of the Chilean Academy of Sciences. In 2018 he became a professor at the University of Bath and was awarded a University Research Professorship by The Royal Society. Furthermore, he was recently granted an ERC Advanced Grant. Among his main contributions are a counterexample to De Giorgi's conjecture in large dimensions and the construction of solutions with prescribed blow-up points in a planar domain for the harmonic map flow into the sphere. More recently, the construction of solutions with highly concentrated vorticity in incompressible Euler flows mathematically validating the leapfrogging phenomenon for vortex rings observed by Helmholtz in 1858.

Title: Delaunay-type compact equilibria in the liquid drop model

Abstract:
We deal with the {\em liquid drop model}, introduced by Gamow (1930) and Bohr-Wheeler (1939) in nuclear physics to describe the structure of atomic nuclei. The problem consists of finding a surface $\Sigma =\partial \Omega$ in $\mathbb{R}^3$ that is critical for the following energy of regions $\Omega \subset \mathbb{R}^3$:

$$\mathcal{E}(\Omega) = \text{Per}\ (\Omega) + \frac{1}{2}\int_{\Omega\times\Omega} \frac{dxdy}{|x-y|}$$

under the volume constraint $|\Omega| = m$. The associated Euler-Lagrange equation is

$$H_\Sigma(x) + \int_\Omega \frac{dy}{|x-y|} = \lambda \quad \forall x \in \Sigma, \quad |\Omega| = m,$$

where λ is a constant Lagrange multiplier. Round spheres enclosing balls of volume m are always solutions. They are minimizers for sufficiently small m. Since the two terms in the energy compete, finding non-minimizing solutions can be challenging. We find a new class of solutions with large volumes, consisting of ``pearl collars with an axis located on a large circle, with a shape close to a Delaunay`s

unduloid surface with constant mean curvature. This is joint work with Monica Musso and Andr\`es Z\`u\~niga.