Dr. Manuel del Pino

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Manuel del Pino is a Chilean mathematician, specialist in asymptotic patterns in nonlinear elliptic and parabolic PDEs. After a degree in mathematical engineering at Universidad de Chile in 1988, he obtained his Ph.D. at the University of Minnesota in 1992, under the direction of Wei-Ming Ni. After postdoctoral positions at the Institute of Advanced Study and the University of Chicago, he became a faculty member at Universidad de Chile, a professor in 2002. In 2010 he was a 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. 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 justifying the leapfrogging phenomenon for vortex rings observed by Helmholtz in 1858.

Title: Solutions with highly concentrated vorticity in incompressible Euler flows

Abstract: A classical problem that traces back to Helmholtz and Kirchhoff is the understanding of the dynamics of solutions to the Euler equations of an inviscid incompressible fluid when the vorticity of the solution is initially concentrated near isolated points in 2d or vortex lines in 3d. We discuss some recent results on these solutions' existence and asymptotic behaviour. We prove 1858's conjecture by Helmholtz on vortex ring leapfrogging dynamics. This is research in collaboration with J. Dávila, A. Fernández, M. Musso, S. Parmeshwar and J. Wei.