Colloquium

The Institute Colloquium: Schrödinger's smoke

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Host:

Beautiful fluid flow phenomena are all around us. An example are the beautiful shapes formed by smoke rising from an incense stick or smoke rings leapfrogging one another. Much of the visual complexity of such phenomena is due to vorticity, the local rotation of fluid particles.
Getting vorticity right in numerical simulations of flows is very challenging and many methods have been proposed to ameliorate associated numerical problems. In this talk I will introduce an entirely new way of representing the velocity field of an incompressible fluid with the aid of a two component wave function, rather than, say, a three component vector. This wave function is augmented with an incompressibility constraint and evolves subject to the Schrödinger equation. The numerical algorithms for time evolution of the fluid are exceedingly simple and exhibit extraordinarily faithful vorticity evolution. I will discuss the basic ideas, implementation, and show benchmark simulations including some comparisons with real fluid experiments. I will also throw in a small segment on the deeper structures underlying this approach with fascinating connections to superfluids, Landau-Lifshitz evolution, and Clebsch variables.

Monday, May 30, 2016 12:45pm - 01:45pm
Raiffeisen Lecture Hall, Central Building

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.
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https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.