Alain Aspect

Professor at the Institut d'Optique Graduate School and the École Polytechnique, Palaiseau; CNRS distinguished scientist emeritus at Laboratoire Charles Fabry, Institut d'Optique

2013 Balzan Prize for Quantum Information Processing and Communication

For his pioneering experiments which led to a striking confirmation of Quantum Mechanics as opposed to local hidden-variable theories. His work has opened the way to the experimental control of entangled quantum states, the essential element of Quantum Information Processing.

Institution Administering Research Funds:
Institut d'Optique Graduate School (IOGS)

Adviser for the Balzan General Prize Committee: Luciano Maiani

Quantum Information Processing and Communication: Quantum Information with Photons and Atoms

I. ***"Young Atom Informaticians" Conference***

The first proposal is to promote a series of conferences, *Young Quantum Informaticians*, based on the model of the Young Atom Opticians conference launched by Professor Aspect and Professor Mlynek twenty years ago to enable PhD students and postdoctoral scholars working in cold atoms to gain experience organizing conferences and creating a European community. The structure of the proposed Balzan conference in the domain of quantum information will follow the same procedures: everything must be organized by junior scholars, and senior academics will be strictly forbidden from interfering with the management of the workshop. Funds will be made available after their project is approved by an ad-hoc committee composed of international experts (Philippe Grangier, Nicolas Gisin, Jürgen Mlynek, Peter Zoller).

II. ***Quantum Simulations of Correlated Matter with Ultra-cold Atoms***

The second proposal is to fund two young researchers, David Clément and Marc

Cheneau, in a joint project involving quantum simulation of correlated matter with ultracold atoms. They intend to take sophisticated measurements giving access to quantum properties of entangled many-body systems of condensed matter. Marc Cheneau's project concerns a cold atom quantum simulator of supersolids, and he intends to measure directly spatial correlations with resolution enabling him to see each individual atom. Balzan funding will be used for the acquisition of a high performance camera and the high grade optical components necessary for this goal. David Clément's project concerns a quantum simulator of a strongly interacting quantum liquid, and he intends to measure how quantum depletion depends on the strength of the interactions. Balzan funds will allow him to buy a laser and to fund a postdoctoral researcher for one year.

Researchers
Research Coordinator: Chris Westbrook

David Clément
Marc Cheneau