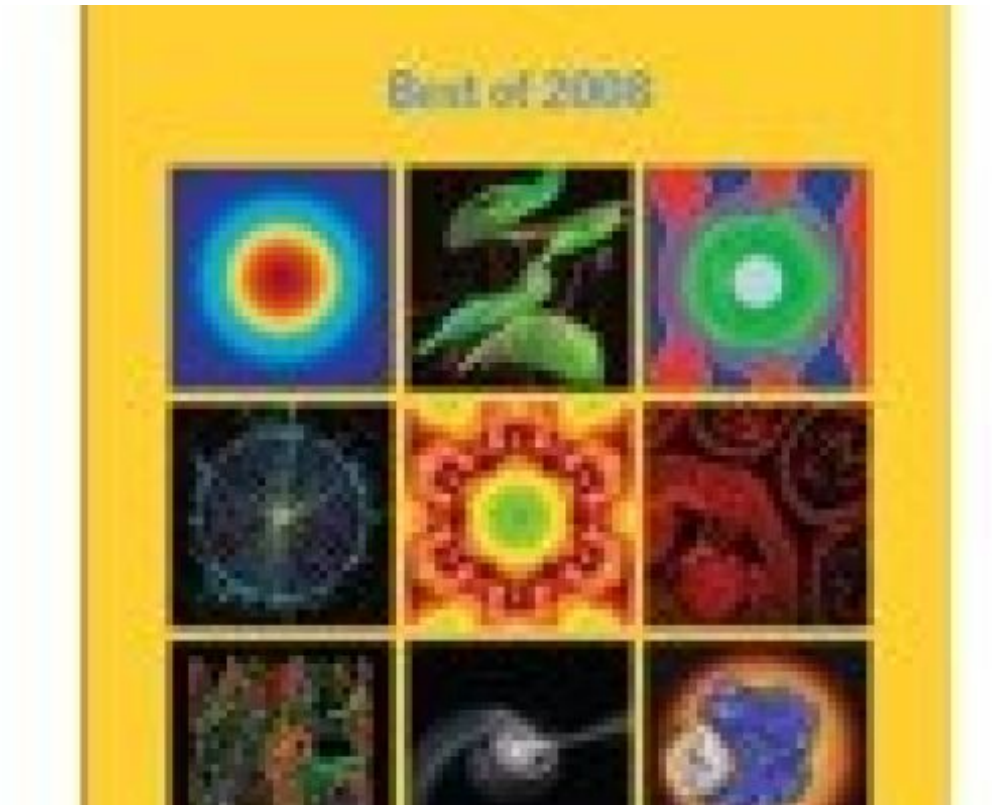

ICFO in NJP Best of 2008

An article on work conducted by Prof. Antonio Acin?s group, highlighted in the *New Journal of Physics Best of 2008*.

April 07, 2009

The *New Journal of Physics* (NJP) highlighted in its Best of 2008 list the article "A convergent hierarchy of semidefinite programs characterizing the set of quantum correlations", co-authored by Dr. Miguel Navascues, former PhD in Prof. Antonio Acin?s group and currently at the Imperial College London, Dr. Stefano Pironio, former postdoc in Prof. Antonio Acin?s group and currently at Geneva University, and Prof. Antonio Acin, ICREA professor at ICFO.

Best of 2008 is thought as a showcase for the diversity, breadth and quality of articles published in NJP last year. The papers are selected on the basis of a range of criteria including referee endorsements, citation and download levels, and simple broad appeal. The selected articles can be freely downloaded as PDFs.

In the paper by Prof. Antonio Acin?s group, the authors are interested in the problem of characterizing the correlations that arise when performing local measurements on separate quantum systems. In a previous work, they introduced an infinite hierarchy of conditions necessarily satisfied by any set of quantum correlations. Each of these conditions could be tested using semidefinite programming. In the highlighted paper, they present new results concerning this hierarchy. They prove in particular that it is complete, in the sense that any set of correlations satisfying every condition in the hierarchy has a quantum representation in terms of commuting measurements. Although their tests are conceived to rule out non-quantum correlations, and can in principle certify that a set of correlations is quantum only in the asymptotic limit where all tests are satisfied, they show that in some cases it is possible to conclude that a given set of correlations is quantum after performing only a finite number of tests. They provide a criterion to detect when such a situation arises, and they explain how to reconstruct the quantum states and measurement operators reproducing the given correlations. Finally, they present several applications for their approach. They use it in particular to bind the quantum violation of various Bell inequalities.