



ICFO Colloquium CARLO BEENAKKER 'The search for Majorana fermions in superconductors'

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April 11, 2014

Friday, April 11th, 12:00, ICFO's Auditorium

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Instituut-Lorentz, Leiden University Prof. Beenakker's work in mesoscopic physics addresses fundamental physical problems that occur when a macroscopic object is miniaturized to dimensions at the nanometer scale.

For "the discovery and explanation of quantum effects in the electrical conduction in mesoscopic systems", he was the co-recipient of the Royal/Shell prize. He was elected a member of the Royal Holland Society of Sciences and Humanities in 2001, and the Royal Netherlands Academy of Arts and Sciences in 2002. He was awarded one of the Netherlands' most prestigious science awards, the Spinozapremie, in 1999. In 2006 he was honored with

the Akzo Nobel Science Award "for his pioneering work in the field of nanoscience". Majorana fermions (particles which are their own antiparticle) may or may not exist in Nature as fundamental building blocks, but in the solid state they can be constructed out of electron and hole excitations. What is needed is a superconductor to hide the charge difference, and a topological phase to eliminate the zero-point motion that would cause an energy difference. A qubit encoded in a pair of Majorana fermions is expected to have an unusually long coherence time. We will discuss strategies to detect Majorana fermions in a topological superconductor, as well as possible applications in a quantum computer.

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