



Seminar

Single-fluxon controlled Resistance Switching in a Nanowire

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Venue: Conference Room A (607), No. 5 Science Building
607

Abstract

The ability to manipulate a single quantum object, such as a single electron or a single spin, to induce a change in a macroscopic observable lies at the heart of nanodevices of the future. Here I report an experimental geometry wherein a single superconducting fluxon can be exploited to switch the resistance of a nanowire between two discrete values. Specifically, we study centimeter-long nanowires of superconducting Ga-In eutectic and observe a hysteretic resistance switching in the presence of a magnetic field. The nonzero resistance occurs when a Ga nanodroplet spontaneously formed along the length of the nanowire traps one or more superconducting fluxons, thereby driving a Josephson weak-link created by a second nearby Ga nanodroplet normal. This experiment opens the possibility of developing single-fluxon logic and memory devices.

About the Speaker

Moses Hung-wai Chan () was born in Xi'an and grew up in Hong Kong. He received his scientific training at Bridgewater College, Virginia (B.A., 1967), Cornell University (Ph.D., 1974) and Duke University (post-doc, 1973-1976). He held teaching positions at the University of Hong Kong (1969-1970) and the University of Toledo (1976-1979) before joining the faculty at the Pennsylvania State University in 1979. He currently holds the title of Evan Pugh Professor of Physics.

Chan's research centers on low temperature phase transition studies of quantum fluids and solids, superconductivity of nanowires in the one dimensional limit. He has trained 20 Ph.D. and 8 master's students and sponsored 17 postdoctoral research associates.

He was a recipient of the Guggenheim Fellowship (1986) and the Fritz London Memorial Prize (1996). He is a fellow of the American Physical Society (1987), a member of the National Academy of Sciences (2000), and a fellow of the American Academy of Arts and Sciences (2004) and the American Association for the Advancement of Science (2007).