

Joint CQSE & NCTS Seminar

2023
Mar. 17, Friday

TIME Mar. 17, 2023, 14:30~15:30pm
TITLE Multiple Andreev-reflection assisted cooling effects in nano-superconducting Josephson junctions
SPEAKER Prof. Jeng-Chung Chen
(Department of Physics, National Tsing Hua University)
PLACE NCTS Physics Lecture Hall, 4F, Chee-Chun Leung Cosmology Hall, NTU
ONLINE <https://nationaltaiwanuniversity-zbn.my.webex.com/>



Abstract:

We demonstrate the cooling effect induced by multiple-Andreev-reflection (MAR) in the thermal hysteresis of superconducting constrictions near clean and short limit. We measure the current-voltage (I-V) characteristics of single constriction and \cup -SQUID devices, and observe a series of voltage-step jumps below the gap (Δ). Our analysis shows that the voltage-steps are signs of the enhancement of superconductivity driven by excess I ; in particular, a MAR-assisted cooling effect taken place at $V \sim \Delta/e$. To illustrate the consequence of the cooling effect, we show the coexistence of normal current mediated by Andreev quasiparticles and Josephson supercurrent in the dissipative state of a \cup -SQUID device. Our findings provide an insightful understanding of nonequilibrium quasiparticle relaxation in mesoscopic superconducting systems and have strong implications for developing superconducting ballistic devices.

Biography Brief:

2003 Ph.D. in Physics at Purdue University, U.S.A.
2004– 2006 Postdoctoral researcher at the University of Tokyo
2006- present Professor, Department of Physics, National Tsing-Hua University

