

Title: Power Coupler for a Superconducting Cavity Resonator for Particle Accelerator Applications

Speaker:

Professor Thomas T. Y. Wong
Department of Electrical and Computer Engineering
Illinois Institute of Technology
Chicago, U.S.A.

Date: Thursday, 15 December 2011

Time: 2:00 pm – 3:00 pm

Venue: Room 603, Chow Yei Ching Building

Abstract:

A coaxial power coupler for a superconducting multicell cavity resonator at 3.9 GHz has been developed. The cavity was intended to be employed as an accelerator to enhance the quality of the electron beam in a free-electron laser. Due to cryogenic, high vacuum and high power requirements, special provisions for two windows and two bellows were implemented. A transition from a rectangular waveguide to a coaxial line was employed to receive the power from the microwave source. The windows and bellows were embedded with the coaxial structure, which was interfaced with the cavity resonator by a probe arrangement. Simulation tool was employed to optimize the coupler structure for low reflection of incident power and dissipation while restraining the field at critical locations to prevent material breakdown. Procedures for testing the coupler on its own and integrated with the superconducting cavity will be described and the measurement results will be presented. The coupler-cavity assembly was tested to exceed the requirement of 9.3 kW input power and an axial field intensity of 14.5 MV/m in the cavity. Coupler return loss and insertion loss were estimated to be 21 dB and 0.2 dB respectively.

Biography of the speaker:

Thomas T. Y. Wong received primary and secondary school education in Hong Kong and read electrical engineering at the University of Hong Kong. After a stint in the electronics industry, he pursued graduate study in microwave measurements at

Northwestern University in the United States. In 1981 he joined the faculty of the Illinois Institute of Technology, where he is now a professor in the Department of Electrical and Computer Engineering. Besides conducting research in the Microwave and RF Laboratory at IIT, he collaborates in research in applied electromagnetics at the nearby national laboratories. His administrative responsibilities included appointments as the ECE graduate program director, the chair of the faculty council, and the chairman of the ECE Department. He is the author of Fundamentals of Distributed Amplification (Artech, 1993), coauthor of Electromagnetic Fields and Waves (Higher Education Press, 2006) and has several patents in the areas of microwave electronics and wireless system design.

Organizer: Prof. Y.S. Hung