

Seminar on

**High-order Dual-band Superconducting Filter Using Compact Dual-mode Hairpin Resonator**

by

**Prof. Haiwen Liu**

**East China Jiaotong University**

**Date : 23 August 2016 (Tuesday)**  
**Time : 10:00 am – 11:00 am**  
**Venue : Room Y5-406, 5/F, Academic 1, City University of Hong Kong**

**Abstract**

Since the discovery of high-temperature superconductor (HTS) in 1986, great efforts have been devoted to the applications of this material. One major application is high performance microwave devices, especially filters, due to its small surface resistance and very high Quality factor value of resonators made by it. HTS filters show excellent performance such as negligible insertion loss, deep out-of-band depression, and steep skirt slope, which can improve the sensitivity and selectivity of microwave system. Thus, in the past decades HTS filters have been studied worldwide and their applications have been realized in many fields.

This report is about a compact dual-mode hairpin ring resonator (HRR) and its practical demonstrations on high-performance dual-band high-temperature superconducting (HTS) bandpass filters (BPF) are presented. To construct two independent passbands, HRR with two controllable resonances is proposed. Distinct resonant characteristics of this new type of resonator are well investigated both by electromagnetic (EM) simulations and theoretical analysis, including its one inherent finite-frequency transmission zero. Also, the interstage couplings of coupled HRRs and external couplings between the HRR and feed-lines are explored for sufficient design freedoms. For the experiment on HTS material, the eighth-order dual-band BPF is fabricated on MgO substrate with YBCO thin films. The measured results agree well with the simulations and show the excellent performance.

**Biography**

**Prof. Dr. Haiwen Liu** received the B.S. degree in electronic system and the M.S. degree in radio physics from Wuhan University, Wuhan, China, in 1997 and 2000, respectively, and two Ph.D. degrees in microwave engineering from Shanghai Jiao Tong University, China, in 2004, and from Saitama University, Japan, in 2016, respectively. From 2004 to 2006, he was with Waseda University, Japan, as a research assistant professor. From 2006 to 2007, he was a research fellow with Kiel University, Germany, granted by the Alexander von Humboldt Research Fellowship, Germany. From 2007 to 2008, he was a professor with Institute of Optics and Electronics, Chengdu, China, supported by 100 Talents Program of Chinese Academy of Sciences. Since 2009, he is a chair professor with East China Jiao Tong University, Nanchang, China. In 2014, he was a visiting scholar in Duke University, USA. In 2015, he was a visiting professor in Tokyo University, supported by JSPS invitation fellowship, Japan.

His current research interests include electromagnetic modeling of high-temperature superconducting circuits, RF and microwave passive circuits and systems, synthesis theory and practices of microwave filters and devices, antennas for wireless terminals, and radar system. He has published more than 100 papers in international and domestic journals and conferences. He has served as a Technical Program Committee (TPC) member for many international conferences and the reviewer for some international journals including IEEE Transactions on Microwave Theory and Technique, IEEE Transactions on Applied Superconductivity, IEEE Transactions on Industrial Electronics, IEEE Transactions on Components, Packaging and Manufacturing Technology, IEEE Microwave and Wireless Components Letters, IEEE Antennas and Wireless Propagation Letters. He is the recipient of Wang Kuancheng Science Foundation(2008), the Best Paper Prize of 2005 International Conference on Communications, Circuits and Systems Proceedings(Hong Kong), the Prize of Osaka City Mayor of Conference of Chinese Alumni in Japan(2005), the 100 Best Ph.D Dissertations in Shanghai, China(2006), National distinguished Ph.D student Scholarship, China(2003), National First-class GuangHua Education Scholarship, China(2002), and Huawei Co. Scholarship, China(1999).

**\*\*\* ALL ARE WELCOME \*\*\***

**Enquiries:**

Professor Quan Xue, Department of Electronic Engineering  
Tel.: (852) 3442 4680 Fax: (852) 3442 0353 Email: eeqxue@cityu.edu.hk