报告四 题目：Nonlinearity Induced Asymmetric Transport and Coherent Perfect Absorption in Complex Microwave Networks

报　告　人：美国卫斯理大学 **王成震** 博士后

报 告 摘 要：

Controlling wave propagation and absorption in complex environments in the presence of nonlinearity is an interesting research topic. Nonlinearity-induced asymmetric transport (AT) can be utilized for on-chip implementation of nonreciprocal devices that do not require odd-vector biasing. This scheme, however, is subject to a fundamental bound dictating that the maximum transmittance-asymmetry is inversely proportional to the asymmetry intensity range (AIR) over which AT occurs. Contrary to the conventional wisdom, we show that the implementation of losses can lead to an increase of the AIR without deteriorating the AT. We develop a general theory that provides a new upper bound for AT in nonlinear complex systems and highlights the importance of their structural complexity and of losses. Our predictions are confirmed numerically and experimentally using a microwave complex network of coaxial cables. For wave absorption in complex environment, I will briefly introduce our recent work on nonlinearity induced coherent perfect absorption (CPA) in complex microwave networks. We theoretically predicted and experimentally observed the nonlinearity induced CPA which can be controlled by external signal power instead of tuning the cavity structure or losses, realizing controlling waves using waves. Furthermore, we uncovered the broadband CPA, which is related to the exceptional point degeneracy. All these provide us new understanding of wave control in the presence of nonlinear elements.