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Observations of parity-time symmetry in optical systems: microtoroid resonators and moving hot atoms JIANMING WEN, LIANG JIANG, Department of Applied Physics, Yale University, USA, YANHONG XIAO, Department of Physics, Fudan University, China, XIAOSHUN JIANG, National Laboratory of Solid State Microstructures and College of Engineering and Applied Sciences, Nanjing University, China, MIN XIAO, College of Engineering and Applied Sciences, Nanjing University, China; Physics, Univ of Arkansas, USA — Compound-photonic systems with gain and loss provide a powerful platform for testing various theoretical proposals on non-Hermitian parity-time (PT) symmetric quantum mechanics and initiate new possibilities for shaping optical beams and pulses beyond conservative structures. Such systems can be designed as optical analogues of complex PT-symmetric potentials with real spectra. However, the beam dynamics can exhibit unique features distinct from conservative systems due to non-trivial wave interference and phase-transition effects. Here, we report two of our recent experiments on the realizations of PT-symmetric optics in two different systems: one uses two directly coupled high-Q silica-microtoroid resonators with balanced effective gain and loss [1]; while the other is the first experimental implementation in an optical system using moving atoms, in which the coupling of two optical modes is realized by coherent diffusion of atomic coherence [2]. In both studies, our theories show excellent agreements with the experimental observations. [1] L. Chang, X. Jiang, S. Hua, C. Yang, J. Wen, L. Jiang, G. Li, G. Wang, and M. Xiao, Nature Photonics **8**, 524 (2014). [2] P. Peng, W. Qu, W. Cao, L. Zheng, S. Shen, J. Wen, L. Jiang, and Y. Xiao (submitted).

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