Manipulation of Van der Waals Exciton Polaritons

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Manipulating cavity exciton polaritons has led to new concepts in fundamental physics and better optoelectronic devices. In this talk I will discuss two different ways to manipulate cavity exciton polaritons in the Van der Waals material system. Harnessing the doping dependence of the two dimensional (2D) semiconductors, the Rabi splitting, dispersion, and nonlinearity of exciton polaritons can be electrically controlled. This result represents an important step to combine the correlation physics in Van der Waals materials and cavity photonics. On the other hand, the flexibility of integrating 2D materials with various types of cavities allows us to investigate the Rabi splitting dependence of the polariton linewidth. This work can reach a general conclusion on the coupled oscillator system: the impact of inhomogeneous broadening of an oscillator on its coupled state can be suppressed by raising the Rabi splitting.

Biography: Zhanghai Chen is currently professor of physics and dean of the college of physical science and technology, Xiamen University. Zhanghai Chen received his B.Sc. and M. Sc. degrees from the department of physics, Xiamen University, China in 1991 and 1994 and Ph.D. degree in physics from Shanghai Institute of Technical Physics, Chinese Academy of Sciences, Shanghai,China in 1997. From 1999 to 2003, he was a postdoctoral research fellow in the Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Japan, working on the spin dynamics of diluted magnetic semiconductors. He joined the department of physics, Fudan University, Shanghai, China in 2003 as a Professor of Physics. Since then, his main research interest is on the light-matter interaction in semiconductor nano/micro structures (e.g. cavity excitonic polaritons, exciton magnetic polaron etc.) and their applications in optoelectronics. He won the Kun Huang Prize from the Chinese Physical Society in 2011, and he was awarded the National Science Foundation of China for distinguished young scientist in 2012.