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Valley polarized exciton polaritons from two-dimensional atomic crystal in microcavity[1] ZHENG SUN, JIE GU, CUNY-Graduate Ctr, AREG GHAZARYAN, ZAV SHOTAN, CHRISTOPHER RYAN CONSIDINE, MICHAEL DOLLAR, POUYAN GHAEMI, VINOD MENON, City College of New York — Two dimensional (2D) atomic crystals of transition-metal dichalcogenides (TMDs) have become an extremely attractive platform to investigate solid state cavity quantum electrodynamic effects. Indeed, strong coupling between excitons in 2D TMDs and microcavity photons have been demonstrated at room temperature by different groups. One of the most intriguing aspects of 2D TMDs is the valley degree of freedom of the excitons that occupy quantum mechanically distinct valleys in the momentum space resulting in helicity dependent transitions. Here we demonstrate the observation of room temperature strongly coupled microcavity polaritons that are valley polarized due to the coupling of the photons with specific helicity to excitons in the distinct valleys. In a metal mirror based microcavity embedded with 2D WS2, we observe strong coupling with Rabi splitting of 80meV and the emission is found to have average helicity of ˜27%. The Fourier space emission shows no angle dependent helicity. The possibility of observing room temperature valley polarized polaritons is a first step towards using valley effects in polariton systems.

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Zheng Sun
CUNY-Graduate Ctr

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