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Intrinsic Exciton Linewidth in Monolayer Transition Metal Dichalcogenides[1] KAI HAO, GALAN MOODY, CHANDRIKER DASS, The University of Texas at Austin, CHANG-HSIAO CHEN, Institute of Atomic and Molecular Sciences, Academia Sinica, LAIN-JONG LI, King Abdullah University of Science & Technology (KAUST), AKSHAY SINGH, KHA TRAN, The University of Texas at Austin, GENEVIEVE CLARK, XIAODONG XU, University of Washington, GUNNAR BERGÄUSER, ERMIN MALIC, ANDREAS KNORR, Technische Universität Berlin, XIAOQIN LI, The University of Texas at Austin — Excitons in monolayer transition metal dichalcogenides (TMDCs) exhibit exceptionally large binding energy, strong optical absorption, and spin valley coupling. These characteristics make TMDCs a promising system for optoelectronics and valleytronics. An important yet unknown property of excitons in TMDCs is the intrinsic homogeneous linewidth, which reflect radiative recombination and irreversible dissipative decay. Here, we use optical coherent two-dimensional spectroscopy to reveal the exciton homogeneous linewidth in monolayer CVD grown Tungsten Diselenide (WSe2). With excitation density and temperature dependent measurements, exciton-exciton interaction and exciton-phonon interactions are quantitatively evaluated. Extrapolating to zero density and temperature, we obtain a residual homogeneous linewidth of $\sim$ 1.5 meV, which places a lower bound of 0.2 ps on the exciton radiative lifetime. This result is consistent with microscopic calculations, which suggest that fast radiative decay of delocalized excitons arises from their large oscillator strength.

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