

Abstract Submitted
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Dynamics of valley pseudospin in single-layer WSe₂. Intervalley scattering mediated by electron-phonon interaction ALEJANDRO MOLINA-SANCHEZ, University of Luxembourg, DAVIDE SANGALLI, Istituto de Struttura della Materia (CNR), Rome, Italy, LUDGER WIRTZ, University of Luxembourg, ANDREA MARINI, Istituto de Struttura della Materia (CNR), Rome, Italy — In a time-dependent Kerr experiment a circularly polarized laser field is used to selectively populate the K^\pm electronic valleys of single-layer WSe₂. This carrier population corresponds to a finite pseudospin polarization that dictates the valleytronic properties of WSe₂, but whose decay mechanism still remains largely debated. Time-dependent Kerr experiments provide an accurate way to visualize the pseudospin dynamics by measuring the rotation of a linearly polarized probe pulse applied after a circularly polarized and short pump pulse. We present here a clear, accurate and parameter-free description of the valley pseudospin dynamics in single-layer WSe₂. By using an ab-initio approach we solve unambiguously the longstanding debate about the dominant mechanism that drives the valley depolarization. Our results are in excellent agreement with recent time-dependent Kerr experiments. The decay dynamics and peculiar temperature dependence is explained in terms of electronphonon mediated processes that induce spin-flip intervalley transitions.

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