Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Generation and evolution of spin-, valley- and layer-polarized excited carriers in inversion-symmetric WSe_2 LUTZ WALDECKER, Stanford University, ROMAN BERTONI, CHRISTOPHER NICHOLSON, Fritz-Haber-Institute, Germany, HANNES HUEBENER, UMBERTO DE GIOVANNINI, Universidad del Pais Vasco, Spain, CLAUDE MONNEY, Universitaet Zuerich, Switzerland, MICHELE PUPPIN, Fritz-Haber-Institute, Germany, MORITZ HOESCH, Diamond Light Source, UK, EMMA SPRINGATE, RICHARD T. CHAPMAN, CEPHISE CACHO, STFC Rutherford Appleton Laboratory, UK, MARTIN WOLF, Fritz-Haber-Institute, Germany, ANGEL RUBIO, Universidad del Pais Vasco, Spain, RALPH ERNSTORFER, Fritz-Haber-Institute, Germany — We present the spin-selective optical excitation of carriers in inversion-symmetric bulk samples of the layered transition metal dichalcogenide WSe_2. Employing time- and angle-resolved photoelectron spectroscopy (trARPES) and time-dependent density functional theory (TDDFT), we observe spin-, valley- and layer-polarized excited state populations upon excitation with circularly polarized laser pulses. We find that scattering of carriers towards the global minimum of the conduction band is very efficient and proceeds within less than 100 fs. TDDFT reveals the character of the conduction band, into which electrons are initially excited, to be two-dimensional and localized within individual layers, whereas at the global minimum of the conduction band, states have a three-dimensional character, facilitating interlayer charge-transfer.

Lutz Waldecker
Stanford University

Date submitted: 08 Nov 2016 Electronic form version 1.4