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Observation of out-of-plane spin-polarization in bulk 3R-MoS_2
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Transition metal dichalcogenide of noncentrosymmetric 3R-type structure, 3R-MoS_2, is investigated by spin- and angle-resolved photoemission spectroscopy. The top of valence bands of 3R-MoS_2 at the Brillouin zone corners (K- and K'-points) are found to show huge spin splitting with z-oriented (Zeeman-type) spin-polarization, in contrast to the nearly spin-degenerate centrosymmetric 2H-MoS_2. The observed spin-polarizations reach $P_z \sim \pm 1$ at $\overline{K}$- and $\overline{K'}$-points, corresponding well with the relativistic first-principles band calculations. It provides the direct evidence of spin-valley coupling realized through the broken inversion symmetry and the strong spin-orbit interaction of Mo 4d-orbitals, leading to the spin-valley polarized state in MoS_2.

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