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Valley susceptibility of an interacting two-dimensional electron system. YAKOV SHKOLNIKOV[1], OKI GUNAWAN, KAMRAN VAKILI, TAYFUN GOKMEN, ETIENNE DE POORTERE[2], MANSOUR SHAYEGAN, Princeton University — In a wide AlAs quantum well grown on a (001) GaAs substrate, 2D electrons occupy two elliptical conduction band minima (valleys), whose major axes lie along the two in-plane <100> directions. Strain-induced energy splitting between these valleys results in an inter-valley charge transfer and consequently in a change of the system's valley polarization. We parameterize this strain-induced change of the valley polarization using valley susceptibility χ_v, in analogy to the spin-susceptibility traditionally used to characterize the magnetic field induced spin-polarization. We find that χ_v dramatically increases relative to its band value as the electron density is reduced, reflecting the dominant role of electron-electron interaction.

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