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Enhancing Electron Coherence via Quantum Phonon Confinement in Atomically Thin Nb_3SiTe_6 JIN HU, XUE LIU, CHUNLEI YUE, JINYU LIU, HUIWEN ZHU, JIBAO HE, JIANG WEI, ZHIQIANG MAO, Tulane University, LIUBOV ANTIPINA, Moscow Institute of Physics and Technology, ZAKHAR POPOV, Siberian Federal University, PAVEL SOROKIN, Moscow Institute of Physics and Technology, TIJIANG LIU, PHILIP ADAMS, Louisiana State University, SEYYED RADMANESH, LEONARD SPINU, University of New Orleans, HENG JI, DOUGLAS NATELSON, Rice University — The extraordinary properties of two dimensional (2D) materials, such as the extremely high carrier mobility in graphene and the large direct band gaps in transition metal dichalcogenides MX_2 (M=Mo or W, X=S, Se) monolayers, highlight the crucial role quantum confinement can have in producing a wide spectrum of technologically important electronic properties. Currently one of the highest priorities in the field is to search for new 2D crystalline systems with structural and electronic properties that can be exploited for device development. Here we report the discovery and the unusual quantum transport properties of the novel 2D ternary transition metal chalcogenide- Nb_3SiTe_6. We show that the micaceous nature of Nb_3SiTe_6 allows it to be thinned down to one-unit-cell thick 2D crystals using microexfoliation technique. When the thickness of Nb_3SiTe_6 crystal is reduced below a few unit-cells thickness, we observed an unexpected, enhanced weak-antilocalization signature in magnetotransport. This finding provides solid evidence for the long-predicted suppression of electron-phonon interaction caused by the crossover of phonon spectrum from 3D to 2D.

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