Abstract Submitted
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Fermi Nesting between Atomic Wires with Strong Spin-Orbit Coupling CHRISTOPH TEGENKAMP, DANIEL LÜKERMANN, HERBERT PFNÜR, Institut für Festkörperphysik, Leibniz Universität Hannover, Germany, BARTOSZ SLOMSKI, GABRIEL LANDOLT, HUGO DIL, Swiss Light Source, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland — Growth of 1.3 ML Pb on Si(557) results in a highly anisotropic wire ensemble structure which undergoes a 2D/1D transition when cooling as seen by surface sensitive transport measurements. In particular, the system becomes insulting in the direction across the wires. We will show that the mutual interplay between superlattice structures, band filling factors, and spin-orbit coupling results in a highly correlated electronic spin and charge state. By means of spin- and angle-resolved photoemission spectroscopy, the spin texture close to the Fermi surface was found to be alternating and equidistant; thus, Fermi nesting occurs in between bands with the same spin helicity, giving rise to spin-polarized charge-density waves in the direction across the wires. An out-of-phase superposition of both Rashba channels is manifested by an extraordinary large Rashba splitting of $\Delta k_0 = 0.2$ $\mathring{A}^{-1} = g/2$, where g is a reciprocal lattice vector defined by the interwire distance and fits into the model of spin-density waves in anti-ferromagnetically ordered chain structures. The implications towards spin-polarized transport along the wires will be discussed.

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