

# Spin-Dependent Hybridization between Rashba-Split Surface States and Quantum-Well States

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## **Abstract**

The electronic structure of ultrathin Ag(111) films covered with a Ag-Bi ordered alloy was investigated by means of spin- and angle-resolved photoemission spectroscopy. Surface-state (SS) bands, spin split by the Rashba interaction, selectively couple to the quantum-well state (QWS) bands, originally spin degenerate, in the metal film. Gaps are found to open between QWS and SS with parallel spins, while free-electron-like QWS dispersions are observed for antiparallel spin configurations. The present results demonstrate that in a nonmagnetic metal film the spin degeneracy of the valence levels can be lifted by hybridization with Rashba-type SS bands.