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One or two dimensional electronic states in gold nanowires on germanium?[1] NICK DE JONG, EMMANOUIL FRANTZESKAKIS, University of Amsterdam, RENÉ HEIMBUCH, University of Twente, ANDREI VARKHALOV, Paul Scherrer Institute, HAROLD ZANDVLIET, University of Twente, MARK GOLDEN, University of Amsterdam — Inspired by the formulation of Tomonaga-luttinger liquid (TLL) theory in the 1960's and its prediction of a spectacular breakdown of Fermi liquid theory in 1D, people have been searching for one dimensional electronic systems. With experimental developments like the advent of scanning tunneling microscopy (STM) and the manipulation of matter on the nanometer and sub nanometer scale, this field has become increasingly accessible for the experimentalist. Self-organised metallic chains on semiconductor surfaces are a class of systems which could harbor 1D behavior. In this field, Au nanowires on the Ge(100) surface have been the subject of debate, with reports of 1D bands from both ARPES and STM (1) and 2D bands in the same system displaying no Luttinger like behavior (2). Here we present high resolution ARPES data from both the Au/Ge(100) system and a new nanowire system: Au/Ge(110). By comparing these different systems with each other an with the electronic structure of the bare Ge(110) surface, we try to give a definitive answer on the question of the dimensionality of the electronic structure of Au nanowires on germanium.

[1] J. Schafer et al., PRL101, 236802 (2008)
[2] K. Nakatsuji, at al., PRB80, 081406(R) (2009)

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