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Thermodynamic compressibility and spin-splitting in one-dimensional quantum wires LUKE W. SMITH, University of Cambridge, U.K., A.R. HAMILTON, University of New South Wales, Australia, K.J. THOMAS, Sungkyunkwan University, Korea, M. PEPPER, University College London, U.K., I. FARRER, D. ANDERSON, G.A.C. JONES, D.A. RITCHIE, University of Cambridge, U.K. — We study spin-splitting and the much-debated 0.7 structure in GaAs quantum wires using compressibility measurements that directly probe the thermodynamic density of states. Two quantum wires are simultaneously defined in the upper and lower well of a GaAs/AlGaAs double quantum well heterostructure, using midline-gated split-gate devices [1]. The lower wire probes the ability of the upper wire to screen the electric field from a biased surface gate. The technique is sensitive enough to resolve spin splitting of the 1D subbands in the presence of an in-plane magnetic field. The compressibility response of the 0.7 structure is measured, and its evolution with increasing temperature and magnetic field is studied [2]. Despite the sensitivity of our measurements we see no evidence of the formation of the quasibound state predicted by the Kondo model of the 0.7 structure. Instead our data are more consistent with theories which predict that the 0.7 structure arises as a result of spontaneous spin polarization.

[1] I.M. Castleton *et al*, Physica B 249, 157 (1998).
[2] L.W. Smith *et al*, Phys. Rev. Lett. 107, 126801 (2011)

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