High magnetic field thermal-expansion and magnetostriction of URu$_2$Si$_2$

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— We present high magnetic field (up to 45 T) thermal-expansion and magne-
tostriction results on URu$_2$Si$_2$ single crystals. The volume change associated with
the transition to the “hidden” order phase becomes increasingly discontinuous as the
magnetic field is raised above 30 T. This confirms recent thermal conductivity and
specific heat experiments indicating a strong coupling between the “hidden” order
parameter and the lattice which suggest some sort of charge ordered state. Several
other transitions are observed at higher fields, many of them showing hysteresis,
while a change in the sign of the magnetostriction coefficient is observed at the
metamagnetic transition ($B_M \sim 38$ T).

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