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The giant plasticity in ^{4}He crystals ARIEL HAZIOT, ANDREW FEFFERMAN, XAVIER ROJAS, Ecole Normale Superieure, JOHN BEAMISH, University of Alberta, SEBASTIEN BALIBAR, Ecole Normale Superieure — We have applied very small shear stresses (down to 1 nanobar) to oriented single ^{4}He crystals, and directly measured their response as a function of temperature (from 15 mK to 1 K), orientation, crystal quality, ^{3}He concentration, frequency and shear stress magnitude. For particular orientations, we have found a giant plasticity that is reversible, associated with the elastic coefficient c_{44} which nearly vanishes around 200 mK. Other elastic coefficients show no measurable anomaly. The strong reduction of c_{44} (80% in high quality crystals with no impurities) shows that dislocations glide in the basal plane of the hexagonal structure with no dissipation. This plasticity disappears as soon as traces of ^{3}He impurities bind to the dislocations (at low T) or if their motion is damped by collisions with thermal phonons (at higher T). It has no equivalent in classical crystals.

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