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Giant isochoric compressibility of solid He4 due to superclimb of dislocations[1] A.B. KUKLOV, CSI, CUNY, Ş.G. SÖYLER, ICTP, Italy, L. POLLET, Harvard, N.V. PROKOF'EV, UMass,Amherst, and Kurchatov Institute, Moscow, B.V. SVISTUNOV, UMass, Amherst, and Kurchatov Institute, Moscow — In the experiment on superfluid transport in solid He4 [PRL **100**, 235301 (2008)], Ray and Hallock observed an *anomalously large isochoric compressibility*: the supersolid samples demonstrated a significant and apparently spatially uniform response of density and pressure to chemical potential μ, applied locally through Vycor "electrodes." We propose that the effect is due to *superclimb*: edge dislocations can climb because of mass transport along superfluid cores and, as a result, the crystal can accumulate extra matter which is, practically, independent of the dislocation density, provided it is uniform. We corroborate this scenario by *ab initio* simulations of an edge dislocation in solid He4 at $T = 0.5K$ with Burgers vector along the C-axis: its superfluid core (split into partials) climbed in response to changes of μ [1]. At low T the effect must be suppressed due to a crossover to the smooth dislocation, with the temperature scale determined by the energy of jog-antijog pair.

[1] Ş.G. Söyler, A. B. Kuklov, L. Pollet, N. V. Prokof'ev, and B. V. Svistunov , Phys. Rev. Lett. **103**, 175301 (2009).

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