Path-Integral Monte Carlo Simulations of the Ideal Strength of HCP Helium 4 MAURICE DE KONING, EDGAR JOSUÉ LANDINEZ BORDA, Universidade Estadual de Campinas — Using path-integral Monte Carlo simulations we assess the ideal strength of solid He-4 in its HCP phase. This fundamental material parameter is defined as the stress necessary to produce irreversible deformation in a defect-free crystal. For this purpose we impose slowly increasing homogeneous deformations to defect-free He-4 crystals and measure the corresponding internal stress state. In this manner, we determine the ideal shear strength in the basal plane as a function of the shear orientation, as well as the tensile and compressive strength perpendicular to this plane. Our results establish upper bounds to the strength of real HCP He-4 crystals.

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