

# Plastic deformation of superionic water ices

Maurice de Koning

*Instituto de Física "Gleb Wataghin", Universidade Estadual de Campinas, Campinas, Brazil*

The recent experimental confirmation of the existence of superionic water ices — phases in which oxygen ions occupy a regular crystal lattice whereas the protons flow through it as a liquid — has sparked an enormous interest in these exotic forms of water, in particular because of their possible role in the anomalous magnetic properties of the ice giants, Neptune and Uranus. Here, we investigate the plastic deformation behavior of superionic water ices using a combination of DFT calculations and large-scale molecular-dynamics simulations of dislocation mobility using a neural network potential-energy surface. The results indicate that the effective viscosity associated with the dislocation-glide mechanism is more than 10 orders of magnitude lower than previously anticipated, offering a new piece to the puzzle of the anomalous properties of Neptune and Uranus.