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Dislocation-mediated plasticity of tubular crystals DANIEL BELLER, DAVID NELSON, Harvard University — We study tubular crystals, two-dimensional lattices with cylindrical topology, in which the radius is not fixed; the geometry can deviate from that of a perfect cylinder, controlled by a combination of stretching and bending energies. Through computer simulation of discretized surfaces, supplemented by analytic calculations, we show how the local radius profile of the tube responds to the presence of dislocation defects. A shift in the tubes radius accompanies the change in the tubes phyllotactic indices along the cylinder axis, on either side of a dislocation, while the radius itself oscillates in the vicinity of the dislocations. When the ends of the tube are free, as opposed to periodic boundary conditions, dislocations can also significantly reorient the tube axis. Through this reorientation, dislocation pairs cause bent, zig-zagged, and intermediately deformed tube conformations, which are dynamically altered by helical glide motion of dislocations through the lattice in response to external stresses.

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