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Arrested dynamics of droplets impacting icy surfaces FARZAD AHMADI, ANDREW FUGARO, Virginia Tech, SAURABH NATH, Laboratory PMMH, ESPCI Paris, PSL Research University, France, LadHyX, Ecole polytechnique, Palaiseau, France, HYUNGGON PARK, JONATHAN BOREYKO, Virginia Tech — We study the competition between the spreading and freezing dynamics of droplets impacting icy surfaces. Experiments were conducted on two different frosted surface configurations: planar or suspended cable. The dynamics of droplet impact were captured using a side-view high-speed camera, where the droplet was initially either at room temperature or close to the freezing temperature. For droplets spreading on the planar substrate, the advancing contact line was arrested significantly faster with decreasing surface temperature or initial droplet temperature. Droplets impacting the icy cable either detached and fell from the cable or were captured and frozen, depending upon the Weber number, surface temperature, droplet temperature, and the ratio of the droplet and cable diameters. A scaling model elucidated that the extent of droplet spreading is a balance between capillary-inertial effects and the specific cooling of the droplet toward its freezing temperature.

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