Abstract Submitted
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**How drops bounce and dance on ice: the role of sublimating surfaces**[1] CARLO ANTONINI, ETH Zurich, ILARIA BERNAGOZZI, University of Bergamo, STEFAN JUNG, DIMOS POULIKAKOS, ETH Zurich, MARCO MARENGO, University of Bergamo, LABORATORY OF THERMODYNAMICS IN EMERGING TECHNOLOGIES TEAM, THEMAL PHYSICS LABORATORY TEAM — Drop rebound is a spectacular event that appears after impact on superhydrophobic surfaces, due to low drop-solid substrate adhesion, and on hot substrates in Leidenfrost conditions, thanks to a vapor layer forming at the liquid-substrate interface, caused by drop evaporation. However, at temperatures below water freezing temperature, i.e. 0C, even superhydrophobicity can get lost. In the present work, we demonstrate that drop rebound can also be originated by another physical phenomenon, i.e. the solid substrate sublimation, at temperatures as low as -79C. To prove this mechanism, drop impact experiments were conducted on solid carbon dioxide, commonly known as dry ice. Drop dynamics and rebound were analyzed, together with the cases of drop impacting on a superhydrophobic surface and on a hot plate, to show how three different physical mechanisms, which apparently share nothing in common, i.e. superhydrophobicity, evaporation and sublimation, can all lead to drop rebound, in an extremely wide temperature range, from 300C down to even below -79C. Additional glycol drop impact tests proved the independence of the observed phenomena from the chosen liquid. Finally, the formation and visualization of an air vortex ring around an impacting drop is also reported.

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