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Bubble Pinch-Off by Inertial Collapse: Loss of Radial Symmetry
N.C. KEIM, P. MOLLER, W.W. ZHANG, S.R. NAGEL, James Franck Institute, University of Chicago — Using high-speed video (120 000 frames/s), we have studied the inertially driven pinch-off of air bubbles from an underwater nozzle. Our work is both consistent with earlier findings concerning the interfacial collapse rate[1] and with data showing collapse that appears to end in sudden rupture instead of by smooth progression to zero radius[2]. In addition, we find that changing the shape and orientation of the nozzle strongly modifies the outcome of pinch-off. A deviation of the nozzle axis by as little as 0.1° from the vertical breaks the cylindrical symmetry of the drop neck. This, in turn, affects the form and orientation of rupture, and the number and sizes of satellite bubbles. Finally, we note the unusual observation of satellite drop formation *within* the cavity of the main bubble.

[1]M.S. Longuet-Higgins, B.R. Kerman, K. Lunde, J. Fluid Mech. 230, 365–390 (1991)
[2]J.C. Burton, R. Waldrep, and P. Taborek, Phys. Rev. Lett. 94, 184502 (2005)

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