

# Ridiculously Large Droplet Cavity Formation

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Oblate

Flat

Bagging

Three ridiculously large water droplets with a volume of 15 mL (equivalent spherical diameter of 3.06 cm) impact onto a quiescent pool of water making three distinctive underwater cavities. Droplets larger than the capillary length (0.27 cm) have extreme amplitude oscillations when released that can lead to various shapes at impact. Droplets are made by a proprietary droplet maker that minimizes the amplitude of oscillation at release, allowing the prolate and oblate amplitudes to be small enough to keep the droplet intact. After release the droplets become prolate then change to oblate, flat and finally bagging. The 7 cm long prolate droplet (left) was released 65 cm from the water surface. Whereas, the flat droplet (middle) and the bagging droplet (right) were released 155 and 215 cm from the water surface, respectively. Cavity shapes are dependent on the shape of the droplet at impact as well as impact speed. Even though the prolate droplet has less kinetic energy it forms the longest narrow cavity, while the flatter droplets make shallower, wider cavities. The bagging droplet case makes a unique large central jet *before* cavity retraction, as most of the kinetic energy is in the droplet rim, forming the jet from the outside inward. Images are approximately 4 cm from water impact and the cavity images are taken near the maximum cavity depth. All images are taken with a high-resolution single lens reflex camera and back-lit with two LED spotlights. Images are all the same scale with a centimeter ruler in the upper left for comparison.