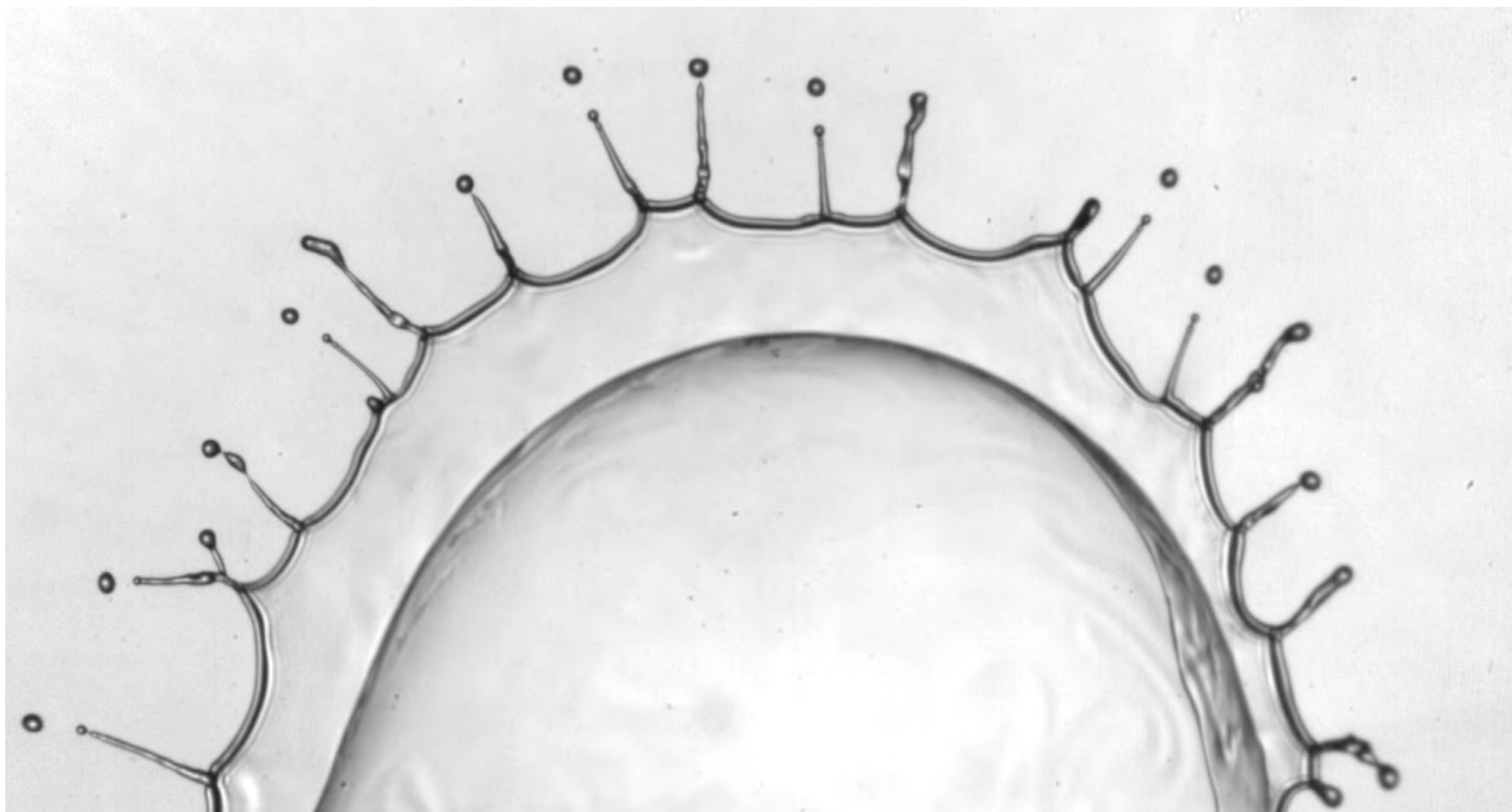
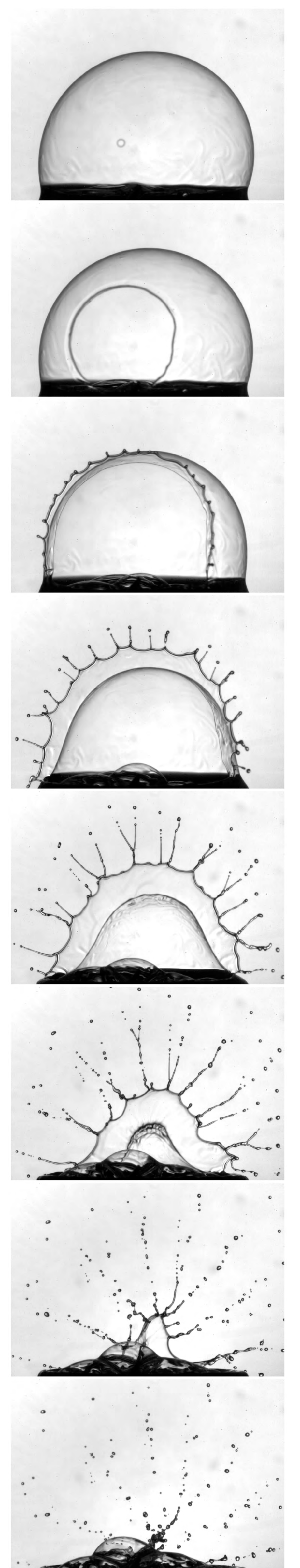


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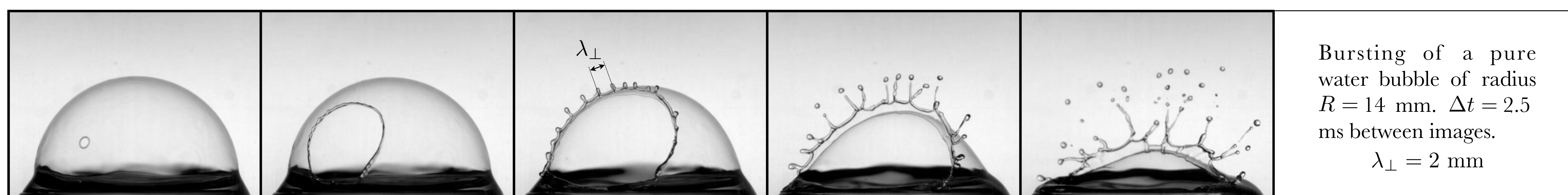
Rim instability and ligament expulsion from a bursting bubble.



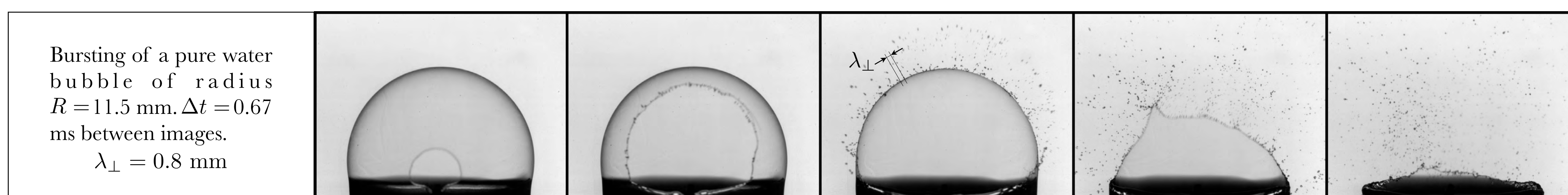
Full sequence of bursting.  $R = 10$  mm and  $\Delta t = 2$  ms between images.

## Thickness, Curvature and Rim Instability

A young bubble is a piece of spherical liquid shell of radius  $R$  with thickness  $h$ . When a hole nucleates, it opens at a constant tangential velocity  $V = \sqrt{2} \sigma / \rho h$  balancing inertia with surface tension forces, and collects liquid in its rim. The centripetal acceleration exerted on the rim perpendicular to the shell surface  $\gamma = V^2 / R$  induces a Rayleigh-Taylor instability of the rim with wavelength  $\lambda_{\perp} \sim \sqrt{\sigma / \rho \gamma} \sim \sqrt{R h}$ .

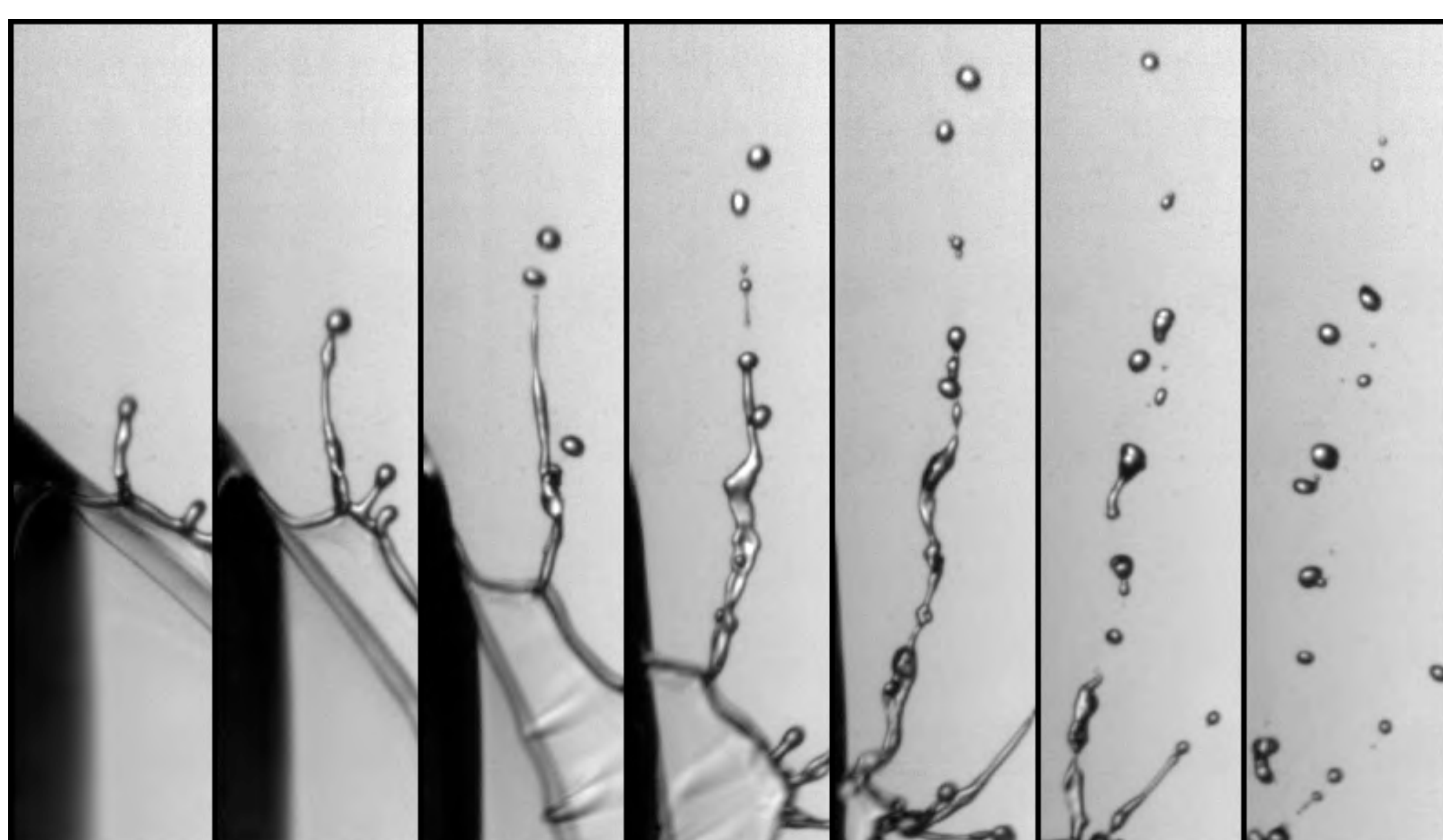


Bursting of a pure water bubble of radius  $R = 14$  mm.  $\Delta t = 2.5$  ms between images.  $\lambda_{\perp} = 2$  mm



Bursting of a pure water bubble of radius  $R = 11.5$  mm.  $\Delta t = 0.67$  ms between images.  $\lambda_{\perp} = 0.8$  mm

## Ligaments and Drop Size Distribution



Ligaments form at the rim crests and are stretched by centrifugation. They ultimately break by a capillary instability, setting the resulting drop size distribution in the spray.

Drop size distribution in the resulting spray and fit by a gamma distribution with  $n = 10$

