Soap halos

Optics and soap bubbles were two passions of Belgian physicist Joseph Plateau (1801–83). He notably studied how the human eye captures images, and he formulated several rules, now known as Plateau's laws, that describe the structure of soap bubbles and foams. Those two interests unite in the optics of soap bubbles to generate intriguing patterns of light, including the ones shown in this photo. The patterns are the projections on a screen of three laser beams—two green and one red—scattered off a Plateau border, the tubular structure where three soap bubbles meet.

The Plateau border has a triangular cross section about 0.5 mm across and acts like a hyperbolic prism. The beams, each one with a different incident angle, get scattered into cones that are centered on the Plateau border axis and manifest as circular halos and arcs reminiscent of ice halos in the atmosphere (see PHYSICS TODAY, February 2015, page 68). Additionally, the visible fringes are the telltale sign of wave optics, including diffraction by the Plateau border's three sharp edges. Alberto Tufaile and Adriana Tufaile at the University of São Paulo have investigated the breadth and details of such phenomena in terms of the geometrical theory of diffraction, which also describes the scattering of high-frequency electromagnetic waves in antennas. (A. Tufaile, A. P. B. Tufaile, *Phys. Lett. A* **379**, 529, 2015; **379**, 3059, 2015. Submitted by Adriana Pedrosa Biscaia Tufaile.) —RJF

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