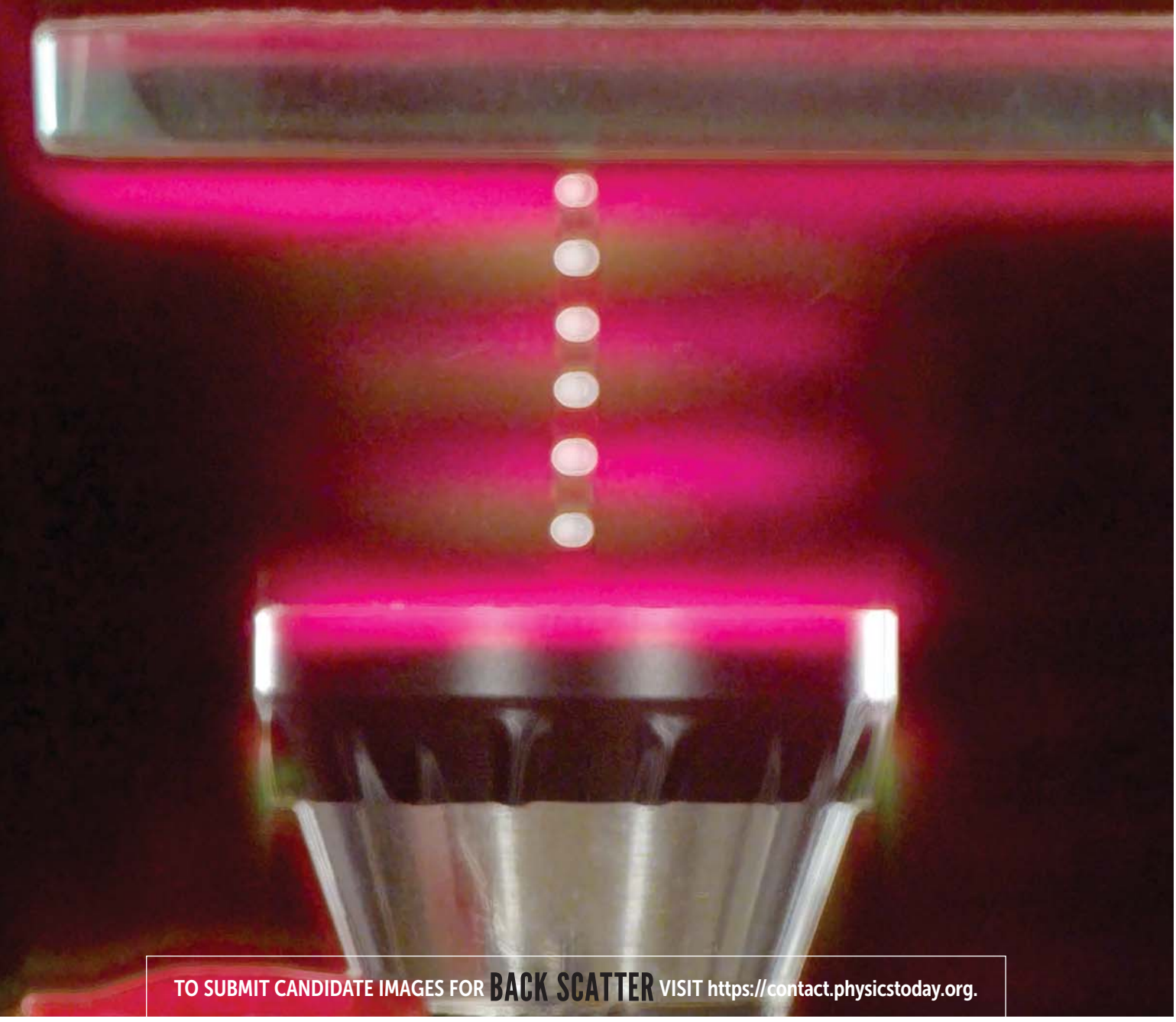
BACK SCATTER

Visualizing acoustic levitation

The six polystyrene foam balls in the middle of the photo are levitated in air by an acoustic standing wave, formed between an ultrasonic transducer below and a glass plate above. David Jackson of Dickinson College in Carlisle, Pennsylvania, and Ming-Hua Chang (now at the Pennsylvania State University) made the wave visible at a specific phase of its cycle by strobing a light source at the same frequency as the acoustic wave. The air's density gradients cause the light to refract and pass through colored filters on either side of a light block. The pink areas designate nodes where pressure is increasing with height, and the green areas indicate nodes of decreasing pressure.

A simple analysis of the linearized fluid equations predicts that an acoustic ponderomotive force would push levitating objects into pressure antinodes. But the observations—including the image here—show levitating balls in both colored bands, which correspond to pressure nodes. Jackson and Chang's experimental results are consistent with a more complex nonlinear effect called the acoustic radiation force. Much stronger than the ponderomotive force, it traps particles at the nodes of the standing pressure wave. (D. P. Jackson, M.-H. Chang, *Am. J. Phys.* **89**, 383, 2021; image courtesy of David Jackson.) —AL



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