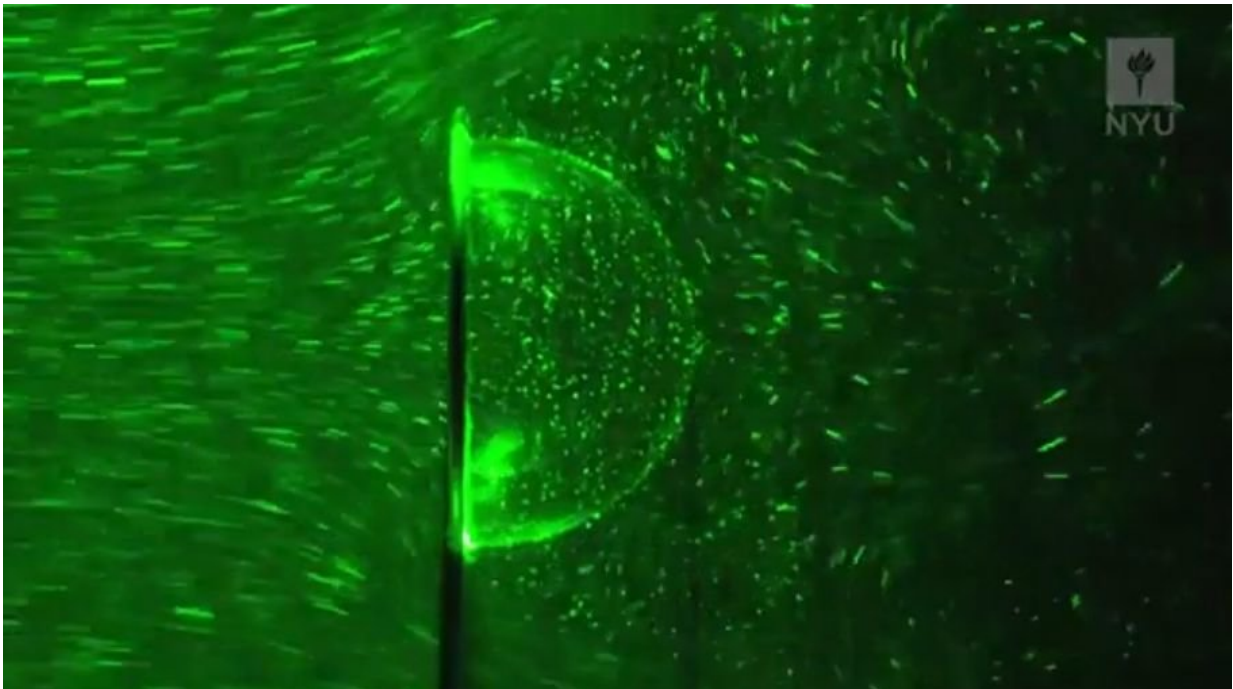


Researchers uncover the science behind blowing bubbles

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What exactly happens when you blow on a soap film to make a bubble? Behind this simple question about a favorite childhood activity is some real science, researchers at New York University have found.

In a series of experiments replicating bubble blowing, NYU's Applied Math Lab has discovered two ways in which [bubbles](#) can be made: one,

by pushing with a steady but strong wind on a [soap film](#) through a circular wand, which causes it to grow into a bubble, and two, by pushing with a gentle wind on an already-inflated film in order to drive its further growth.

"This second method might explain how we often blow bubbles as kids: a quick puff bends the film outward and thereafter the film keeps growing even as the flow of air slows," says Leif Ristroph, an assistant professor at NYU's Courant Institute of Mathematical Sciences who led the study.

The first method is more intuitive, but less common.

"This is used by the bubble blowers we see in parks in the summertime," explains Ristroph. "They simply walk, sufficiently fast, it seems, with a soapy loop of rope, which provides the relative wind needed to stretch out the film."

The results, reported in the journal *Physical Review Letters*, point to potential applications in consumer products that contain bubbles or droplets, such as sprays, foams, and emulsions, which are combinations of unmixable liquids.

The paper's other researchers were Likhith Ganedi, an NYU undergraduate at the time of the work and now a graduate student at Carnegie Mellon University, Anand Oza, a postdoctoral fellow at the time of the research and now a professor at the New Jersey Institute of Technology, and Michael Shelley, a professor at the Courant Institute.

As a physics problem, blowing bubbles is a question of how a liquid film—typically soapy water—interacts with an imposed flow of an external fluid, which is air in the case of bubble blowing. This dynamic is crucial in understanding how to enhance industrial production of many

chemical products.

To break down the science that explains this process—i.e., what events precede the formation of bubbles—the researchers created an experiment, replicating the blowing of bubbles, using oil [films](#) suspended in flowing water and pushed through a wire loop wand.

"Working with water instead of air has many advantages in terms of controlling, measuring, and seeing flows," Ristroph explains. "This is the trick that made these experiments possible."

Their experimental observations, combined with predictions drawn from mathematical models, allowed the researchers to understand the forces that produced the resulting film shapes.

Their findings give a precise recipe or set of instructions for how to blow bubbles—and with it, related production processes.

"We can now say exactly what wind speed is needed to push out the film and cause it to form a bubble, and how this speed depends on parameters like the size of the wand," explains Ristroph.

Provided by New York University

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