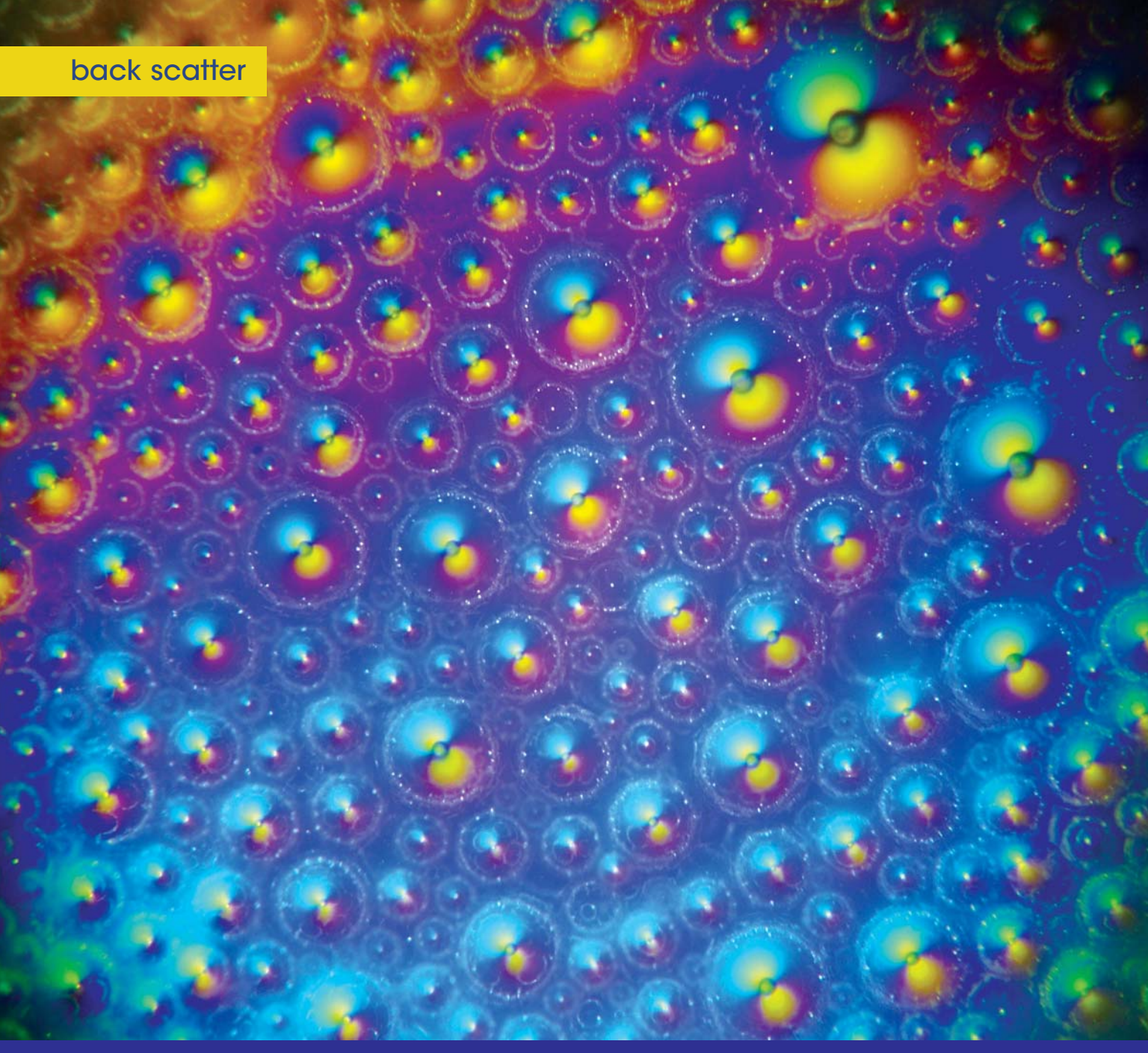

Bubbles in contrast

Crossed polarizers, staining, and oblique and dark-field illumination are but a few of the myriad methods that have been developed to enhance the contrast in optical microscopy. Such techniques can bring out different or otherwise imperceptible features in an image and make even the familiar appear unfamiliar. For example, this is an image of an ordinary film of soap bubbles on a microscope slide. Its unusual look arises from reflected-light differential interference contrast (DIC) microscopy, which maps slope in the northwest–southeast direction to color. Andrew Resnick of Cleveland State University uses such images in undergraduate classes on optics.

In reflected-light DIC microscopy, which originated in the mid 1950s, linearly polarized light is sent through a so-called Nomarski prism, comprising two stacked wedges of a birefringent crystal. The prism splits the traversing light into two components that have orthogonal polarizations and emerge in slightly different directions. The waves pass through a lens that focuses them onto a sample; reflected light passes back through the same lens and prism. On the return trip, the prism recombines the two components. Because they experience different optical paths due to variations in the topography of the specimen, their recombination produces constructive or destructive interference. The resulting color thus serves as a measure of the local slope in the shearing direction. (Image submitted by Andrew Resnick.)

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