

Webcams offer a low-cost way to tune lasers for serious science

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Every photon in a laser beam marches in lockstep, at an identical wavelength that depends on what the laser is used for – for example, infrared lasers that drive the optic fiber internet. For many applications, lasers need to be precisely tuned to those wavelengths, and the wavelength-measuring instruments can be more expensive than the lasers themselves.

Now, using a handful of inexpensive components – including an off-the-shelf computer webcam and a small [diffraction grating](#), a device for splitting and diffracting light into several beams – researchers have built a diffraction spectrometer that can tune lasers with better than one part-per-million accuracy.

"The accessibility, simplicity, and cost make it feasible to provide such [precision measurements](#) for every single laser in a laboratory," says physicist and study co-author Robert E. Scholten of the University of Melbourne.

Indeed, Scholten says, the instrument, which is described in the AIP's journal *Review of [Scientific Advances](#)*, is simple enough to be constructed in undergraduate physics labs – "and could easily be a high-school project," he adds. "It would provide excellent training in optics and the wave nature of light, and once constructed, the device can be used to elucidate the quantum mechanical structure of matter, for example by measuring the fine-structure splitting or even the hyperfine structure of atoms such as sodium."

More information: "Compact diffraction grating laser wavemeter with sub-picometer accuracy and picowatt sensitivity using a webcam imaging sensor" is published in *Review of Scientific Instruments*.

rsi.aip.org/resource/1/rsinak/v83/i11/p113104_s1

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