LASERS MAKE SOME NOISE

In the 50 years since Theodore Maiman demonstrated the first working laser, physicists have labored to build devices capable of controlling sound waves in the same way that optical lasers manipulate light. In recent months, two teams of researchers announced the development of successful sound-based lasers, or "sasers."

Optical lasers use quantum effects to produce an intense beam of light of a single frequency, or color. The big challenge in translating that capability to sound has been finding an analogous way to amplify just one sonic frequency. Physicist Tony Kent and his colleagues at the University of Nottingham in England managed to create such an amplifier from a thin, layered lattice made of two semiconductors, gallium arsenide and aluminum arsenide. The resulting saser can build up an intense, pure sound wave at a specific frequency in the terahertz range (far, far above the limit of human hearing) for a few billionths of a second.

Researchers' next goal is to lengthen the duration of the sonic amplification. Caltech physicist Kerry Vahala and his group are making progress in that direction with a different type of acoustic laser. Their technique relies on firing an optical laser at tiny glass membranes to amplify sound. Unlike the Nottingham saser, Caltech's device can run continuously, but it operates at a slower speed of 50 megahertz. Vahala is working to boost that frequency into higher ranges, which will probably be more useful for acoustic imaging.

Other potential applications for sasers include detecting defects in microscopic structures and improving signal processing in semiconductor chips, the scientists say. Vahala has no doubt that once the technology matures, it will quickly find all kinds of other uses as well. After all, optical lasers now perform eye surgery, scan groceries, and play movies off DVDs. "But when the laser first came out," Vahala says, "no one had the foggiest idea what to do with it." LAURIE RICH