Who invented the laser?

- Arthur Schawlow biography
- Charles Townes biography
- Bell Labs Historical Contributions

What is a laser?

Why are lasers important?

What's happening today?

- Lucent Threw a Party and Everyone Came
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Where can I learn more?

Bell Labs Innovations

Bell Labs and Lucent Contributions to Laser Research

Since the concept of lasers was first published, Bell Labs has been in the forefront of laser research. Here are just a few of Bell Labs' recent contributions to the field since it became a part of Lucent Technologies.

Multiwavelength QC laser

Scientists at Bell Labs have demonstrated the first semiconductor laser that can simultaneously emit light at multiple widely separated wavelengths in the invisible region of the spectrum, where most gases and vapors leave telltale light-absorption fingerprints. The new device could be used in pollution and environmental monitoring, industrial process control, and combustion and medical diagnostics.

(For more information, see *Scientists Demo Hi-Power, Multi-Channel Semiconductor Laser* .)

'Bow-Tie' Lasers

Using chaos theory, scientists from Bell Labs, Yale University, and the Max Planck Institute of Physics in Germany have demonstrated novel semiconductor microlasers that use "bow ties" of laser light to emit highly directional beams with more than 1,000 times the power of conventional, disk-shaped microlasers. The microlasers are so small that hundreds could fit on the head of a pin.

(For more information, see *Bell Labs, Yale, Max-Planck Team Uses 'Bow Tie' Laser Light to Make Microlasers* .)

206-Channel Lasers

Scientists at Bell Labs have made a 206 wavelength laser -- a single laser that can do the work of 206 lasers by generating light pulses -- each lasting just 100 millionths of a billionth of a second -- and using wavelength-division multiplexing (WDM) to transmit the data over multiple wavelengths.

(For more information, see *Bell Labs Scientists Use An Ultra-Fast Laser To Transmit Data Over 206-Wavelength Information Rainbow* .)

[more]

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Bell Labs Innovations

Quantum Cascade Lasers

Bell Labs scientists have demonstrated the world's first laser-based semiconductor sensor that operates at room temperature and at high power to detect minute amounts of trace gases or pollutants -- potentially parts per billion -- by scanning for their optical-absorption wavelengths, invisible but telltale "fingerprints."

(For more information, see *Bell Labs scientists demonstrate new high-power, laser-based sensor technology for gas detection, pollution monitoring* .)

EMILM Lasers

An enhanced laser module -- the E2550 electroabsorption-modulated isolated laser module (EMILM) -- has been developed by Bell Labs that nearly doubles the transmission distance capability of lightwave communication systems without the use of regenerators. The device can transmit 320,000 conversations across spans of up to 1,000 kilometers, setting a new industry benchmark.

(For more information, see *Lucent Laser Module Doubles Transmission Distance* .)

Tunable Quantum Cascade Lasers

Bell Labs researchers have demonstrated continuously tunable, single-mode, high-power room-temperature quantum cascade (QC) distributed-feedback lasers operating at mid-infrared wavelengths (5 and 8.5 micron) in pulsed mode. QC lasers, invented at Bell Labs in 1994, operate operate like an electronic waterfall: When an electric current flows through a QC laser, electrons cascade down an energy staircase; every time they hit a step, they emit an infrared photon, or light pulse.

(For more information, see *Bell Labs Distributed-Feedback Quantum-Cascade Lasers Additional Technical Information* .)

[more]

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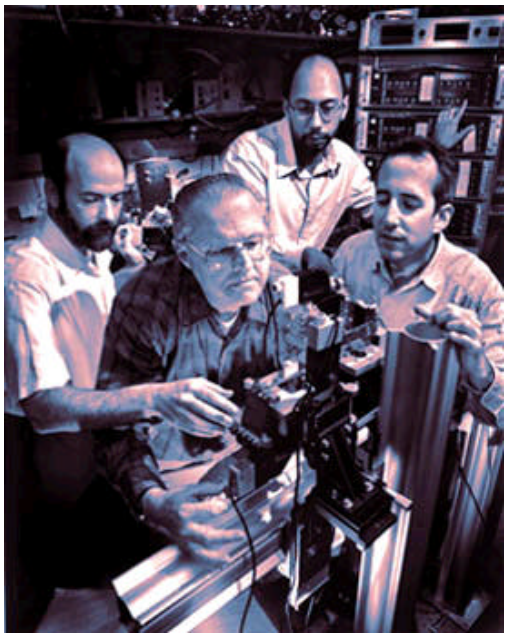
2.5 Gb/s 'free space' transmission

An innovative "no-fiber optical data link" set a world record -- transmitting 2.5 gigabits of information per second, error free, through 1.5 miles of free space -- by integrating two custom-built telescopes with standard optical transmitters and receivers and a high-power optical amplifier.

(For more information, see *Bell Labs Sets Record for 'No-Fiber Optical Data Link'* .)

And Bell Labs develops tools to make better lasers

One exciting tool is the X-ray microprobe (XMP) that measures strain in smaller volumes of material and detects trace elements better than any other non-destructive deep probe in the world. The instrument produces an X-ray spot only two microns across -- about .0001 inch. The XMP makes it possible to study micron-size features in a range of structures, such as lasers and electronic circuits.



Bell Labs scientists Matthew Marcus, William Lehnert, Ken Evan Lutterdot and Eric Isaac make adjustments to their x-ray microprobe.

(For more information, see *New X-Ray Microprobe From Bell Labs Helps Lucent Design Better Laser Modules* .)

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