this loving, caring and witty person that goes beyond his physics.

His was a rare gift of being able to teach the most technical subject in a manner that not only could be understood by anyone but would motivate them to learn more. More people should have come to know about him during the Challenger commission hearings. His notes published in the February 1988 issue of PHYSICS TODAY (page 26) and in his book *What Do* You *Care What Other People Think?* were worth far more than the entire commission report. One can only hope that the report will have a positive effect on NASA management, although NASA's ills are not unique but are symptomatic of many large American companies supported by the government and the Department of Defense.

Thank you Richard Feynman. Your spirit and work will continue to inspire and live on beyond us all.

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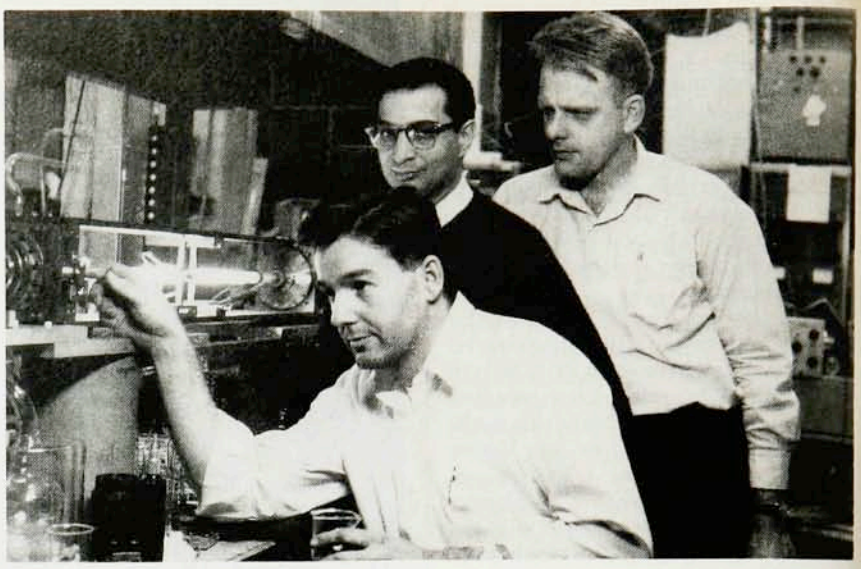
2/89

The First He:Ne Laser: An Amplification

There was one minor flaw in Joan Bromberg's carefully written article on the early development of the laser (October 1988, page 26): The date ("early in 1960") given for the photograph of the first helium–neon laser on page 33 is off by nearly a year. That particular laser was first assembled in the lab I shared with Ali Javan toward the end of the summer of 1960 and was tried in various forms throughout that fall. The first version involved a water-cooled microwave discharge coupled to an S-band magnetron—which turned out to melt the discharge tube. The second version had a quartz electrodeless rf discharge tube of the type that eventually worked. However, the high-reflectance mirror coatings flaked off the mirrors during bake-out in our vacuum system.

No one was interested in photographing the device until after it had oscillated (in its third version) on 13 December 1960. I have enclosed a copy of a Polaroid snapshot that was taken on that occasion, showing the laser in its original environment. From left to right are Donald R. Herriott, Javan and myself. The location was the lab in which we took all of the basic data reported in our first article.[1] In the background, behind the large bake-out oven, are three other experiments: ones in which Ali and I measured the He^*–Ne excitation transfer cross section and detected gain in the helium–neon system early in 1960; and a third that I had put together to measure lifetimes of the pertinent neon levels.[2] Don Herriott had designed the Fabry–Perot structure and is shown adjusting one of the micrometer screws with one hand while holding a beaker of potable liquid in the other—a substance that we all shared to celebrate the event. The Bell Labs publicity department evidently felt the original environment was too cluttered, and the laser was moved to the more pristine environment of Herriott's lab during January 1961 for a series of artificially posed photographs—one of which was reproduced in Bromberg's article. While it was there, Don Herriott took some more careful data on the optical properties of the laser beam.[3]



The original gas laser survived three more trips: At the request of the Bell Labs administration, Don and I took it in a station wagon to a hotel room in New York City, where we actually managed to get it aligned and oscillating on a rather rickety wooden table for a press conference held on 1 February 1961. The mirrors had to be aligned within approximately 1 arcsec; people used to high-gain confocal lasers have no idea what was involved in getting a plane-parallel system to oscillate with approximately 1% gain per pass. That laser survived the return trip to Herriott's lab and then one more back to Ali's lab, where one of the Kovar-to-glass seals was broken.

The second successful gas laser oscillated in April 1961 and consisted of a more stable four-rod structure that I designed to study mode pulling and spectral hole-burning effects.[4] It is currently in my lab at Yale and still oscillates. The third was an all-quartz design by Herriott, which ultimately became an exhibit at the Smithsonian.

Almost a year went by before anyone outside of Bell Labs succeeded in making an oscillating cw helium-neon laser. As I recall, that was accomplished by Roy Paananen at Raytheon and not by any of the people who later collected royalties on our invention.[5]

References

1. A. Javan, W. R. Bennett Jr, D. R. Herriott, Phys. Rev. Lett. **6**, 106 (1961).
2. W. R. Bennett Jr, in *Advances in Quantum Electronics*, J. R. Singer, ed., Columbia U. P., New York (1961), p. 28.
3. D. R. Herriott, in *Advances in Quantum Electronics*, J. R. Singer, ed., Columbia U. P., New York (1961), p. 44.
4. W. R. Bennett Jr, Phys. Rev. **126**, 580 (1962).
5. W. R. Bennett Jr, A. Javan, US Patent 3149290, 15 September 1964. A. Javan, W. R. Bennett Jr, D. R. Herriott, US Patent 3614653, 19 October 1971.

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Corrections

March, page 21—The quotation from Alex Malozemoff should have referred to "the large *critical* current densities obtained in thin films."

March, page 64—Stephen R. Leone is still employed by the National Institute of Standards and Technology (formerly the National Bureau of Standards). He works in the division that is part of the Joint Institute for Laboratory Astrophysics at the University of Colorado, Boulder. He is also an adjoint professor in the university's chemistry department and a lecturer in the physics department. ■