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Dr. Amnon Yariv, Caltech

I joined a small group at Bell Labs in 1960. The paper by Schawlow and Townes was out for about two years, and there was a big race worldwide to make a laser.

There were three or four groups at Bell at the time: Derrick Scoville, C.G.B. Garrett, Ali Javan, and others, all taking different approaches to making lasers. And the question was, which of the various supporters at Bell Labs would be the winner. We took bets, as a matter of fact.

In 1960 I took my annual vacation with my wife and new baby, and we went to San Diego. After a week in San Diego, I got a phone call from Jim Gordon, my boss. He said, "There's a fellow up at the Hughes Research Lab in Malibu who claims to have made a laser. Could you take a day off at our expense and shoot out to Malibu and check it out?" So I did.

I drove the three-hour drive to Malibu to meet Ted Maiman of Hughes (Aircraft Company). He very nervously showed me his first results.... And I guess he wasn't quite sure of himself. You know, when you're claiming you've made the world's first laser, you're nervous. And he was seeking reassurance.

Well, I thought he had it and I told him so. Then I called Jim Gordon and said, "Jim, I think we lost the race."

But in typical Bell Labs fashion, we weren't quite ready to concede defeat. We said, "That was done on a pulsed basis; that's not very important." Well, you know how many pulsed lasers have been made since then.

So there was a lesson in that, which I tell my students in quantum electronics: that, with all of us working full time, with a lot of technical support, looking for a laser, we all thought CW (continuous wave). It never occurred to us to try it on a pulsed basis, which of course was a lot simpler.

And Ted Maiman, working alone at Hughes Malibu, actually working against the wishes of his boss, took a different approach. So in a way we were kind of brainwashing each other.

Those were very exciting days, and they were exciting because almost everything we did was new and publishable at that time.

Bell Labs researcher Claire Gmachl, co-inventor of the 'bow-tie' laser, enjoys the festivities.

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- Elsa Garmire, Dartmouth College
- Alastair Glass, Bell Labs
- Herwig Kogelnik, Bell Labs
- Dr. Hermann Haus, MIT
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Elsa Garmire, Dartmouth College

I was a freshman in college and I never heard of the laser, of course. Never heard of the maser, either, but in 1960 or '61, I'm not sure which, I was working during the summer at Argonne National Laboratories, and I remember that Nicholas Bloemberger and Ted Maiman gave a talk on the maser and the excitement about the work on the laser.

I couldn't understand about whether he talked about the excited state being "pumped" or "bumped," with his accent, but it interested me at the time because I didn't understand exactly what it was. Well, two years later, I got the opportunity to start working with Professor Townes and in January of '62 we had the second commercial ruby laser. I remember spending the first year of my Ph. D. program working to make sure that the laser didn't arc to ground when it got cold or that the vapor from the air shorted it out. Eventually we got it to work, and it was a lot of fun.

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Alastair Glass, Bell Labs

We're also celebrating tonight Charlie Townes' 57th wedding anniversary. (applause) And, as his wife says, it's to the same husband.

While we're partying, I think it's a good idea to remember that we're celebrating a singular event that is probably going to change mankind as much as any other invention in our lifetime. We're especially lucky and honored to have the inventors here tonight with us. All of our lives and our jobs, I presume, have been enabled by this invention. This party is dependent on (a) the invention of the laser, (b) the fact that Wayne Knox and Donna Cunningham (Bell Labs PR) decided that it's time we celebrated and that we should be celebrating things more often, and (c) that Gerry Butters, who is the chief of our optical networking business, was willing to fund it.

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Herwig Kogelnik, Bell Labs

The laser has certainly made the field of quantum electronics and optical communications a very, very exciting field, and the excitement has now lasted for 40 years, and it's getting more exciting.

I'm convinced now with the momentum that we see everywhere, with optical communications in particular selling like hotcakes, and with higher and higher capacity every year, that we'll have another exciting 40 years.

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Dr. Hermann Haus, MIT

I was a post-doc student of Charlie Townes, and I learned everything I know about quantum electronics from Charlie. I entered the laser field because it does have a lower limit on the noise performance of amplifiers, and Tony Siegman, who might be in the audience tonight, felt the same way. We entered the field at the same time, so our first papers were actually written on the noise of the "optical maser."

That's one thing that Charlie Townes would have liked the laser to be called, an optical maser. On this one, he didn't win. It's called the laser. So, anyway, Charlie, congratulations on your fantastic accomplishment.

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Arthur Schawlow

I guess you all know that the word laser is an acronym standing for Lots of Applied Scientists Eat Regularly. And some of them do.

It's been an exciting 40 years, and it's still exciting. The thing that turns me on now, particularly, is that lasers now permit people to study single atoms and single photons, and we're really learning a lot more about just how strange the world of quantum mechanics is and finding new ways to test it. So far it stands up to everything, but a bunch of clever people will find other ways.

And it's nice that there are medical uses. Some of you have probably heard me say before that although there is a lot of talk in the newspapers about death rays, there still aren't any real death rays as far as I know. But one of the first applications of lasers was for surgery of the retina in the eye to prevent blindness from retinal detachment. Neither Charlie nor I had ever heard of surgery for detached retinas to try to prevent blindness, and if we had, we probably wouldn't have been fooling around with stimulated emission from atoms.

It's been a great 40 years.

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Charles Townes

We appreciate what Lucent Technologies has done in putting on this party for all of us. There are many aspects of science which are really most enjoyable. One of them is that once we understand something, it's so obvious. And it's a part of our civilization and part of all of us from then on. Science contributes. If it's something that's right, it keeps going, it's obvious. We build on it.

The other aspect is really the sociology of science. Any one idea is limited in a sense with any one person, but the interaction between people is what builds it, and all of you have contributed so much and made this field grow, made it what it is -- seeing new possibilities. That growth depends in part also on personal interactions, the trading of ideas, discussions back and forth, everybody adding a little bit more, seeing something new. I've picked up suggestions from I don't know how many people.

I'm reminded of the kind of situation illustrated by Nico Bloembergen's invention of the three-level maser. Nico went over to MIT and heard Woody Sternberg talking about using spins to produce maser amplification, and Nico was sitting there in the seminar and he said, "Well, why in the world would you want to do that? What's the purpose of doing that?"

And Woody said, "Well, look, this will be the most sensitive amplifier in the world."

"Oh," he said.

Now, he was working on paramagnetic materials and he went home and quickly we had the three-level maser.

And that's the way things happen. We interact. The

sociology of science is a very important part of it. All of you have contributed so much, and the field is growing because of these contributions, additional insights, and other things which get added on.

The field grows and grows. It's still young, and we can look forward to many more years of wonderful exploration.

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