International Journal for Innovative Engineering and Management Research
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IJIEMR Transactions, online available on 10th April 2022.
Link: https://ijiemr.org/downloads/Volume-11/Issue-03
DOI: 10.48047/IJIEMR/V11/I04/9
Title: **HISTORY OF THE ORIGIN OF LASERS**
Volume 11, Issue 04, Pages 39-42
Paper Authors: **Kasimov Asror Sadiyevich, Khaydarov Shahzod Karimovich**

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HISTORY OF THE ORIGIN OF LASERS

Kasimov Asror Sadiyevich
Head of the Department of General Physics, Termez State University,
Khaydarov Shahzod Karimovich
Termez State University, I stage master's degree

Annotation. The article analyzes some of the research in laser physics and describes, discusses, and summarizes the history of laser physics on a scientific basis.

Keywords: Laser and laser physics, history of lasers, intensification of light due to forced radiation.

INTRODUCTION

The word "laser" is derived from the English word "laser", the full name of which is derived from the first letter of the phrase "Light Amplification by Stimulated Emission of Ratiation", which means "intensification of light due to forced radiation". Laser radiation is ultraviolet, infrared, and electromagnetic waves in the visible range.

We know that in 1916, Albert Einstein proposed that under the right conditions, atoms could emit excess energy as light when they were excited spontaneously or by light. In 1928, Rudolf Ladenburg said that there was indirect evidence of stimulated emission, but physicists of the time did not understand the meaning of "negative absorption" as "negative absorption." V.A. Fabrikant obtained forced radiation in an experiment by arousing mercury vapors with an electric discharge. In 1939, with the help of forced irradiation, he said, "there could be an environment where light could be amplified."

V.A. Fabrikant proved that the intensity of light can be increased "at the expense of forced radiation" during the study of the spectrum of gas discharges in 1940-1941. Optical quantum generators are based on three basic ideas that have emerged in various fields of physics. The first idea belonged to Einstein, who postulated that forced radiation was possible in the theory of non-coherent thermal radiation. The second basic idea is to use unbalanced thermodynamic systems, in which electromagnetic waves can be amplified rather than absorbed. A third idea in the field of radiophysics is to use positive feedback to convert an amplified system into an auto-oscillating system, an electromagnetic coherent wave generator. Willis Lamb, R.S. Rutherfort said that nuclear magnetic resonance can cause population inversion, and Edward M. Pursel and Robert V. Pound used this effect to observe the stimulated emission of 50 kHz radio waves. In 1951, V.A. Fabrikant, MM Vudensky, and FA Bugaev received patents for their discovery of the "electromagnetic wave amplification phenomenon" and for their invention of the "electromagnetic wave amplification method." This discovery paved the way for the development of quantum electronics and the creation of quantum amplifiers and optical quantum generators and their unparalleled

development. In 1951, Charles H. Taunes, then at Columbia University in New York, devised a way to generate amplified emissions at microwave frequencies. In 1955, AM Prokhorov and NG Basov created the first ultra-high frequency quantum generator. It was an optical quantum generator-mazer in the microwave range. In 1958, at the same time as Prokhorov and Basov, the American physicist CH Towns proved the spectrum of visible light.

N G Basov and AM Prokhorov were awarded the Lenin Prize in 1959 for their discovery of a new principle for amplifying and generating electromagnetic waves and for creating molecular generators and amplifiers. In 1958, Charles Townes and Arthur Schawlow used infrared or visible spectrum light. The visible laser has written and published articles about the invention, but they have not done any research. On March 24, 1959, another scientist, Charles Townes and Arthur Schaulov, were granted a patent.

Maserat was used as an ultrasonic detector for radio signal amplification and space exploration. In 1960, Theodore Maiman invented the first ruby laser called the optical and light laser. Many historians claim that Theodor Maiman invented the first optical laser, but there is an objection that Gordon Gould was the first to invent it.

Gordon Gould was the first to use the word "laser." There is good reason to believe that Gordon Gould created the first light laser. Gould was a doctoral student at Columbia University and the inventor in charge was Charles Townes. Gordun Gould was inspired to build his own optical laser in 1958. The gas laser was the first permanent-beam laser and was the first to work "on the principle of converting electrical energy into laser light." It has been used in many applications. A laser using ruby crystal (ruby) as the active medium was invented in the 1960s. Subsequent discoveries included a laser using a mixture of neon Ne and helium He gases, and a laser using a silicate glass containing neodymium ions in 1962.

Lasers using neodymium solution selenoxychloride and organic dye solutions in inorganic liquids were invented in 1966. In 1964, N G Basov, AM Prokhorov, and American physicist Ch. Towns were awarded the Nobel Prize in Physics. Meymer In 1960, to create an active environment, it was necessary to selectively stimulate the atoms to provide inversion employment in at least one of the energy levels in its atoms. Inverse employment is created in a variety of ways. Since the processes of radiation and absorption of light have been discussed in detail before, we begin by describing the optical method of selective arousal of ambient atoms. A ruby laser can be considered as an optical quantum generator using the optical method of excitation. This generator was the first quantum generator in history to emit radiation in the visible field of the spectrum. November The first man to treat a patient at Harkness Eye Institute at Columbia University. In 1962, Robert Hall and his partners at the General Center for Electrical Research and Development in New York created the first semiconductor laser. This year's article, "Incredible Laser," described a mass image of the laser at the time. He promised to present an exciting report on the new "Aladdin Lamp" of science. He can light up the moon, kill in an instant, or perform miraculous surgery.

Market analysts predicted laser radars on the battlefield by 1964 and laser power transmissions from the ground to satellites by 1965.

Dr. Stephen Trokel patented an excimer laser vision correction. The Excimer laser was first used in the 1970s to wrap silicone chips.

In 1982, Rangaswamy Srinivasin, James Wynne, and Samuel Blum, who worked at IBM research laboratories, saw the potential for an excimer laser to interact with biological tissue. Srinivasin and the IBM team realized that you can remove tissue with a laser without bringing any heat to neighboring materials.

Steven Trokel Steven Trokel, an ophthalmologist in New York City, made contact with the cornea and in 1987 performed the first laser surgery on the patient's eyes. The next decade was spent on improving the equipment and techniques used in laser eye surgery. In 1996, the first excimer laser was approved in the United States to use ophthalmic refraction. Dr. Frodoov's observations on eye physiology in the 1970s made it possible to apply selective surgery using radial keratotomy. The next decade was spent on improving the equipment and techniques used in laser eye surgery. Properties and Application of Different Types of Lasers Due to the properties of Titanium Sapphire Laser Crystal, it has a wide adjustable range (i.e. wavelength range) and can emit light with a wavelength of 660 nm-1200nm according to needs.

Combined with the frequency doubling technology (which can double the light frequency, i.e. double the wavelength), it can extend the wavelength range from 330nm to 600nm.YAG This is an abbreviation of yttrium aluminum garnet. At present, this substance is the best laser crystal matrix with a wide range of properties. After treatment with neodymium (Nd), it can emit 1064 nm of light and the maximum constant output power can reach 1000w.

Dye laser A laser that uses organic dye as a laser tool is usually a liquid solution. Dye lasers can be used at wider wavelengths than gaseous and solid state lasers. The wide bandwidth makes them very suitable, especially for adjustable and pulsed lasers. However, due to its short lifespan and limited output power, it has been largely replaced by a solid-state laser with adjustable wavelengths such as titanium sapphire.S- conductive laser This is a laser that uses a semiconductor material as the working substance.

Optical fiber laser This refers to the laser using a unique ground element glass fiber, which has a wide range of applications such as laser fiber communication, laser space remote communication, industrial shipbuilding, automotive, laser engraving, laser marking, laser cutting. , printing rollers, metal Metal drilling / cutting / welding (brazing, quenching, coating and deep welding), military defense safety, medical equipment and devices, large-scale infrastructure, as a pump source for other lasers, and so on.

Free electron laser This is a new type of high power coherent radiation source that differs from traditional lasers. It does not require gas, liquid, or solid as the working material, but converts the kinetic energy of high-energy electron beams directly into coherent radiation energy.

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