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The Quality Factor of Semiconductor Laser Diode Light, the Restriction to Plane and the Unusual Behavior

KEYWORDS: Laser diode, laser, bending, curve, nonlinear, semiconductor laser

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ABSTRACT *In this experimental study, using specially designed lenses, the spread of the laser light the plane (compression) was limited; the space existing in the laser light was mas made to spread discontinuously and the wave packet was made to bend and divide at the same time. These processes were made at room temperature and atmospheric pressure. During the experiment, in order to affect the laser light, polarization, magnetic field, electric field or any additional material and system was not used. In addition, a quality factor has been proposed regarding the laser light used in the industry.*

1.INTRODUCTION

Studies on light goes back to 1900 BC. Some of the scientists who focused on optical studies are, without the order by date, Ploton, Claudius Ptolemy, Heron, al-Haytham, Al-Kindi, Victim, Farabi, Ibn Sina, Ibn Rushd, Farsi, Mirim Çelebi, Takiyüddün, Heraclides, Aristotle, Copernicus, Kepler, Galileo, Descartes, Huygen, Fresnell, Fermat and Newton [1-5].

Einstein combined his theory of relativity with the speed of light using the Lorentz transformation. He finished his studies in 1911, reviewing his theorem. This study was called as the theory of relativity [6-7]. Minkowski, Lorenz, Poincare, Planck, Laue, Lewis, Tolman and many other scientists contributed to the theorem of relativity [5].

Schwarzschild developed the theory that the light would bend while passing through the black and white holes [5]. In 1985, C.A. Frost and his team published the results of the experimental study on laser light bending in the magnetic field [8].

The theorems of geometrical under linear and homogenous environments and Snell's equations were provided in detail [9-13]. The optical Raman effect is used in nonlinear fiber optic communication systems [14-15].

A few of the existing theories of physics are standard model, quantum mechanics, quantum-electrodynamics, chroma quantum electrodynamics, K and M model, super symmetry, super strings, the anti-symmetry, the Higgs, super-peers, symmetry breaking, the weak and strong nuclear area and weak and strong magnetic field models [16-28].

2.THE EXPERIMENT CONDUCTED WITH THE SEMICONDUCTOR LASER DIODE

The experiment was conducted in the laboratory at room temperature and atmospheric pressure. It was observed that the differences in the shapes were due to the various lenses used and there was unusual behavior of laser light.

In the experiment, the CW laser was used as a source optical and with output power 1 ... 5mW, "CLASS-III" semiconductor laser diode operating with two pieces of standard AAA 1.5V. This laser source is an electronic component manufactured commercially without a special purpose

Different shapes were obtained by using different lenses. A 10-Mpiksel resolution camera was used to take the photos of the shapes. The distance between the laser source and the optical lens ranges from 4-400 mm and the distance between the optical lens and the plane is 4500 mm. The captured images are the final images spreading in the atmosphere after passing through the lens and are emitted in the atmosphere.

In the experiment in Figure 1, one-piece lens which is custom-designed was used. Because of the feature of the lens used, the spread of the laser light was limited to the plane, compressing the laser light in the plane. This limitation was achieved through the compression of the laser light to the plane with internal reflections due to the physical structure of the lens used. It is possible to arrange the desired size of the spread of the laser light.

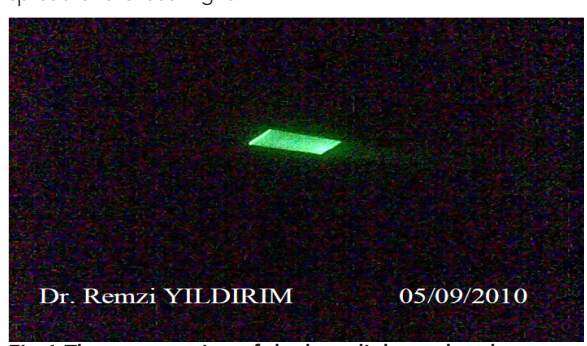

Fig.1 The compression of the laser light to the plane

The bending process in figure 2 was captured by change during the experiment. We think that these holes exist due to the non-homogeneous nature of the lens or the change in the glass structures while laser light is passing through the lens. Another approach is that these holes may have occurred as a reverse-phase initiation takes place due to the non-homogeneous nature of the lens, thereby causing the waves to weaken each other.

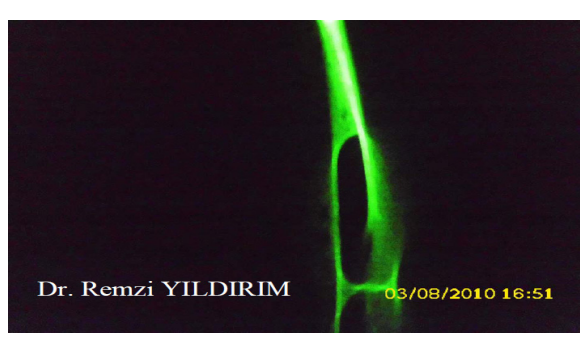

Fig.2 The bending of the Laser light and the space in it

Figure 3 is the final image of the laser light after it passed through a different one-piece lens. The laser light, after pass-

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ing through the lens, expands and bends at a certain length. Then, being discontinuous, the light disappears from the visible area or is lost. We think that in this area, due the reverse-phase initiation weakens the laser light and it becomes visible as the waves strengthen each other again. The light between the two visible areas shows discontinuity whatever the reason is. A physical event occurs between these two visible areas, which we cannot measure due to the technical reasons.

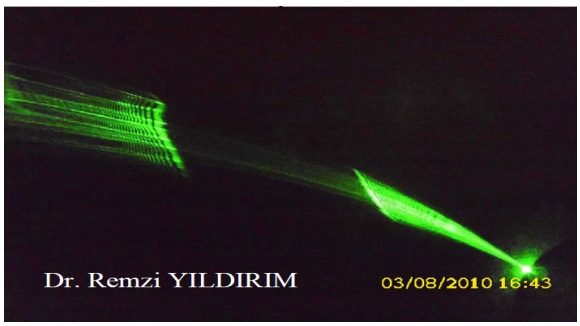

Fig.3 The discontinuity of the laser light.

Figure 4 is the output image obtained through the one-piece lens that we developed. The laser light and the wave packet (group velocity) which is created by the successive groups of photon can be observed. Therefore, the laser radiation is composed of discontinuous packages. In this experimental study, the distance between the wave packets, the optical power of each packed and the time interval between the two packages were not measured due to the technical reasons.

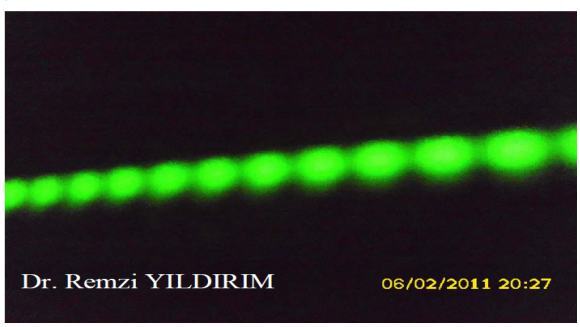

Fig.4 The display of wave packet of laser light

When we consider our experimental study, we think that there is a relationship between the wave packet of the laser light and its quality. We can show this relationship as $R = L/D$, setting the diameter of the wave packet (D), the distance between two wave packets (L) and quality factor (R). We think that the smaller the equitation is or the nearer it is to zero, the lower the distance between the two wave packets and the better the quality of the laser light. When the distance between packets is long, the average density of the photon wave packet density per unit area decreases. Accordingly, the average optical power of laser light also varies. We recommend the R ratio as the quality factor for the laser light used in industry, particularly in metal processing and drilling processes which are smaller than 50 μm.

In Figure 5, the laser light coming from only one source is both divided and bended at the same time. It is possible to bend and divide more than two at the same time [29-30].

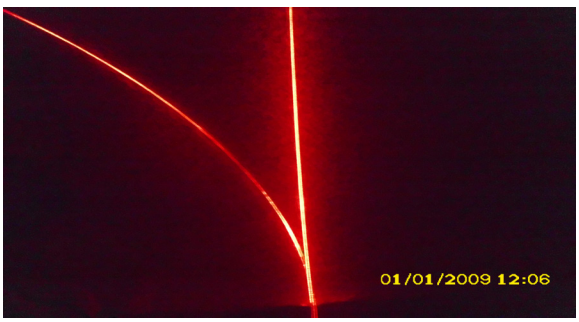

Fig.5 The division and bending of the red laser light

3. CONCLUSION

In this experimental study, we believe that in addition to the characteristic behavior of the light, we have added a new feature such as "bending". These might be the symptoms of new subatomic parts or particles that we overlook or the feature of the structure of the light present in the current physical models which we could not notice. Another explanation can be the fact that light can have a flexible symmetrical structure consisting of photon and subatomic parts or particles, which is different from its known photon model.

We suppose that bending occurs via affecting the weak point of the light with the lens used and causing the physical deterioration in the flexible and symmetrical structure. These unknown subatomic parts or particles, under some critical conditions, can have so powerful effects to cause light to have permanent characteristics. We could not find out what these subatomic parts or particles are due to the technical reasons and we cannot explain the reasons of bending. We also could not generate the physical and mathematical model of the bending of the light, the hole in the light and its discontinuous spread. We can not explain the bending of the laser light and its unusual behavior using the current physical models. We just found out the current situation in the experiment. We expect all kinds of support, suggestions and criticism of the scientists interested in the study and the findings.

Appendix

We believe that these sub-atom particles exist in the particle ocean of element and appear during appropriate conditions. We calculated the dimension of the smallest basic particle, which we cannot as yet know, as $8{,}401785525\times10^{-66}$, its mass at 1,5x10^{12}K heat as $5{,}600119035\times10^{-80}\,gr$ and its energy as $1{,}2\times10^{80}\,eV$.

As stated by Weinberg, when science and technology has the system of 10^{35} Plack length and 11 dimensional visualization, it will be possible to image these sub-atom particles.

Note:The study details of the lenses are not given, because it is in the process of patent.

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