

On the Essence of Light and the Speed of Light and the Main Cause of Determining the Speed of Light

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Abstr: Through decades of efforts, I have written more than 200 articles on physics, more than half of which discuss issues related to light. The last few articles have clarified the nature of light, and at the same time, the nature of the speed of light. The essence of light is the result of the vector superposition of the Coulomb force generated by the matter composed of atoms as the basic unit that is emitting light (to be exact, vibrating at the frequency of visible light). When the change frequency of its intensity is in the range of visible light and reaches the level that can be recognized by the human eye, it will be seen by the human eye that it is emitting light. The essence of the speed of light is the transmission speed of the vibration state of the matter composed of atoms as the basic unit of light. This article carries on the summary elaboration regarding this.

First, the nature of light and its main reasons and basis

1、A Brief Introduction to the Nature of Light

The essence of light is the result of vector superposition of Coulomb force produced by matter composed of atoms as basic units, which is emitting light (to be exact, vibrating at visible light frequency). When the change frequency of its intensity is in the range of visible light and the intensity reaches the level that can be recognized by human eyes, these luminous substances will be seen by human eyes, which is called visible light. When the change frequency of its intensity is not strong enough to be recognized by human eyes in the visible light frequency range, it is black. When the intensity of different frequency bands in the visible frequency range is different, different colors will appear.

2、The main reason and basis for proving the nature of light

2.1、The object that the human eye sees is the matter that is emitting light and is composed of atoms as the basic unit, not the so-called light.

I am in the "human beings see in the end is what?"? From two GIFs of high-speed photography related to light (<https://www.toutiao.com/article/7289745544258273850/>), What are the objects that can be seen by human beings? (<https://www.toutiao.com/article/7292737425825235495/>)、 "Point light source imaging experiment under total reflection condition and its result analysis" (<https://www.toutiao.com/article/7503074623932858920/>) and "What does it mean that the reflection point of point light source on the mirror surface is visible in all directions under near total reflection condition?" (<https://www.toutiao.com/article/7505255929185780275/>) and other articles clearly concluded that what the human eye sees is a luminous substance composed of atoms as the basic unit, not the so-called light.

2.2、The human eye has never seen an object that is not composed of atoms

So far, no one has ever seen an object that is not composed of atoms. In fact, all video devices have never recorded non-atomic objects. In all physical experiments, in order to observe all kinds of non-atomic objects, it is necessary to use atomic detection devices to achieve observation. Such as: cloud chamber, crystal, water and other liquid detection devices, the object of observation is composed of atoms as the basic unit of the material.

2.3、Astronauts in direct sunlight in space see the darkness around them

The fact that the scene seen by an astronaut in the direct range of sunlight in space is not sunny,

but dark, is direct proof that what the human eye sees is not so-called light, even if the sunlight in space is much stronger than that on the ground.

2.4、The night sky of the earth is dark when there is no external light and the moon

On a moonless night on the ground, if there is no ground lighting around, the night sky is dark, and the sunlight above the night sky can not be seen. Only when the moon is overhead, it will produce secondary light under the action of sunlight to illuminate the ground and be seen.

2.5、The sky of the earth on sunny days is mostly blue sky and white clouds, and the earth seen by astronauts in space is also blue + white clouds

This phenomenon proves that people on Earth and astronauts see the same luminous body: the ionosphere and white clouds that are glowing in the atmosphere.

2.6、When the light source is only monochromatic, objects of different colors show different colors and follow the principle of vector superposition of forces

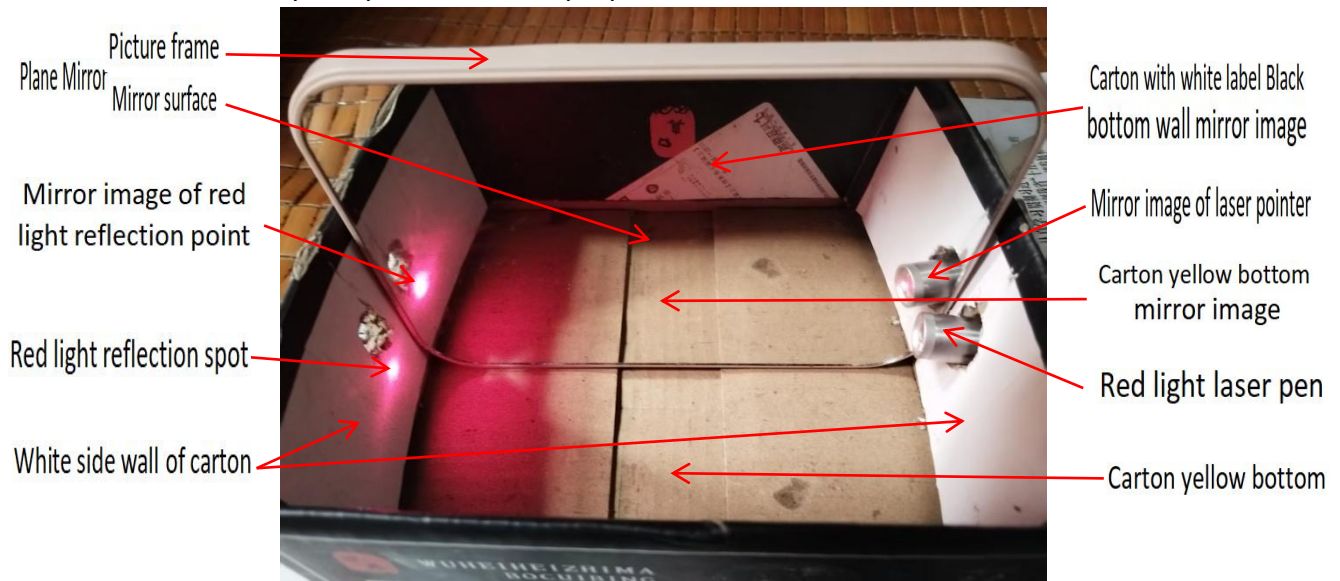


Photo 1: a plane mirror is erected in the middle of the carton, and a red laser pointer on the right side shines on the middle of the mirror and reflects to the left side

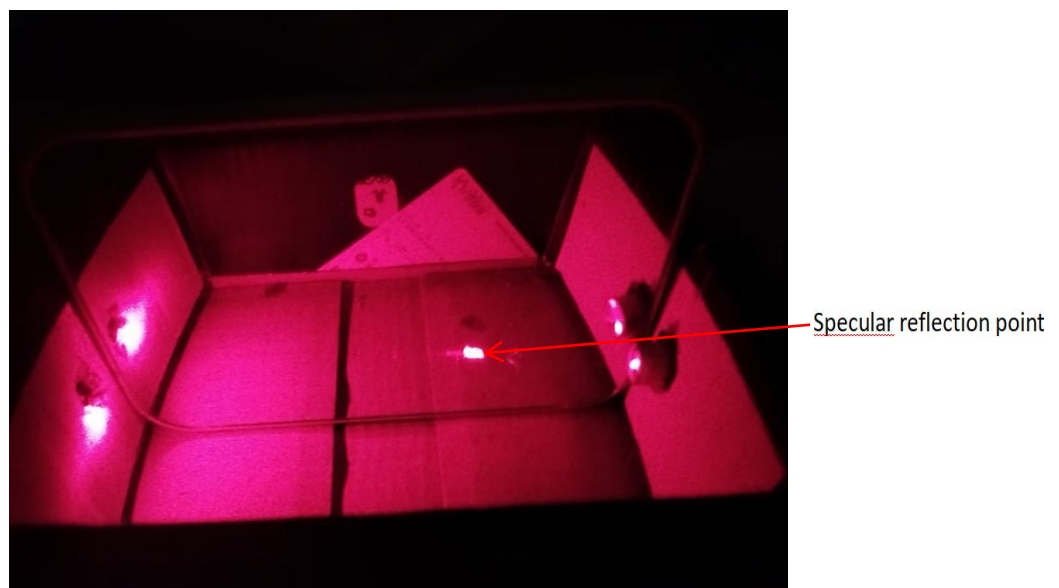


Photo 2: The photo in the darkroom corresponding to Photo 1

When the experimental device in photo 1 is placed in the darkroom, photo 2 can be obtained. It can be seen from Photo 2 that under the illumination of the only red light source, the colors of objects with different colors are not all red, but show the vector superposition effect of their colors

under natural light and red: when the red light is strong, it shows red (such as the left side wall and the left third of the box bottom); when the red light is weak, it shows the natural color (such as the right two-thirds of the box bottom, the right side wall and the lower wall mirror image).

2.7、 Under the condition of near total reflection, the specular reflection spot can be seen in all directions and the intensity is basically the same

The light spot at the specular reflection point in photo 2 can be seen in any orientation and direction where the point can be seen directly, and its brightness is basically the same. Because the condition of the photo is almost total reflection (the reflectivity of the plane mirror is above 90%, and when the incident angle is greater than 85 degrees, its reflectivity should be higher), if the light is photons or electromagnetic waves, the light generated by the laser pen should be basically reflected to the left, and there will be almost no reflected or scattered light in other directions and directions. But the second photo directly denies this possibility. This is enough to prove that what the human eye sees is the matter that is glowing, not the so-called light.

2.8、 It is impossible for human eyes to see objects moving at high speed, which directly proves that what human eyes see can not be light moving at the speed of light

When the human eye sees something, there will be visual residue, and when the picture is greater than 25 frames per second, it will form a continuous action. Therefore, it is impossible for the human eye to see anything moving at the speed of light, including the so-called light itself.

Second, the nature of the speed of light and its main reasons and basis

1、 A Brief Introduction to the Nature of the Speed of Light

Because the human eye sees the substance that is emitting light, the so-called speed of light should be the transmission speed of the luminous state between the substances that are emitting light, just like the speed of water waves and sound waves, it is the transmission speed of the vibration state of water molecules and air molecules, not the speed of water molecules or air molecules.

2、 The main reason and basis for proving the nature of the speed of light

2.1、 The essence of light determines that the essence of the speed of light can only be the transmission speed of the luminous state

Because the essence of light is that the matter composed of atoms as the basic unit is vibrating at the frequency of visible light and generating the corresponding Coulomb force, the force will naturally act on other adjacent matter composed of atoms and make them emit light (the so-called reflection, scattering, refraction, transmission, diffraction and diffraction of light are all secondary light/Coulomb force generated by the passive light emission of the acted atoms).

2.2、 The sudden change or even sudden increase of the speed of light at the interface of different media proves that the essence of the speed of light can only be the transmission speed of the luminous state

The phenomenon that the velocity of light at the interface of different media will suddenly change, or even suddenly increase, can not be explained by photons or electromagnetic waves. For example, the speed of light entering the air from glass suddenly increases from about 200,000 kilometers per second in glass to about 300,000 kilometers per second, and the direction also changes suddenly. The medium interface is only the contact surface of different atoms, and it is impossible to have the ability to make photons or electromagnetic waves suddenly increase and change direction at the same time. Otherwise, atoms inside a homogeneous medium should also cause photons or electromagnetic waves to change speed and direction. However, the actual situation is that the speed of light in a uniform medium is basically constant.

2.3、 The speed of light in different media is generally anti-correlated with the density of the medium, which proves that the essence of the speed of light can only be the transmission speed of the luminous state

There is a delay in the transfer of the luminous state between the two luminaires (the so-called half-wave loss is the result of this delay). When an atom vibrating with a certain frequency is regarded as an electric dipole with the same frequency, the maximum value of the Coulomb force produced by the atom is synchronized with the maximum value of the electric dipole moment of the electric dipole, but the time when the Coulomb force acts on the adjacent atom and makes the electric dipole moment of the adjacent atom reach the maximum value is different by half a period. This is the root cause of the so-called half-wave loss. The mechanism and physical meaning of half-wave loss phenomenon in reflected light (<https://www.toutiao.com/article/6943141929446048260/>) have more detailed certification), the more the number of atoms per unit length, the greater the transmission delay. Therefore, the greater the density, the lower the speed of light.

2.4、 The different speeds of light with different frequencies in the same medium prove that the essence of the speed of light can only be the transmission speed of the luminous state

Generally, the speed of light in a homogeneous medium varies inversely with the frequency of the incident light: the higher the frequency, the lower the speed of light. This may be due to the fact that the delay in the transmission of the luminous state of light of different frequencies in the medium is positively correlated with the frequency. The higher the frequency, the greater the delay, and thus the lower the transfer speed.

Third, a brief analysis of the main factors determining the speed of light

In my book "An attempt to infer the main factor determining the speed of light from the main factor determining the speed of wave" (<https://www.toutiao.com/article/7305684461344621106/>) and "Analysis of the Main Factors Determining the Speed of Light and Brief Analysis of the Calculation Methods of the Speed of Light" (<https://www.toutiao.com/article/6836653627369587203/>) clearly pointed out that the speed of light is determined There are three main reasons: the first is the speed C of the light produced by the static light source in vacuum; the second is the regeneration times N or the total delay Δt of the light in the medium within the unit length; the third is the speed U of the light source relative to the observer. However, when I compiled the "Accurate Calculation Method of Vacuum Permeability and the Physical Meaning of Simplified Calculation Results" (<https://www.toutiao.com/article/7477025901063209509/>), I found that only the Coulomb force interaction velocity between charged particles in relative motion and their motion state were assumed. It can be concluded that the theoretical value of vacuum permeability is close to the measured value. If the interaction velocity of Coulomb force is assumed to be independent of the motion state of charged particles, the theoretical value of vacuum permeability is close to zero! This proves from one side that the interaction velocity of Coulomb force is directly related to the relative motion state between charged particles.

Although my analysis of the main factors determining the speed of light in the above two articles is basically in line with the facts, it is not rigorous. It should be accurate and rigorous to say that the three main factors determining the speed of light are: the first is the velocity V of the interaction of Coulomb force between static charged particles in vacuum; the second is the number of transmission times N of luminous state in unit length; and the third is the velocity U of the light source relative to the observer/observation device.

There is a little difference between the speed of light of a stationary light source measured in vacuum and the interaction speed of Coulomb force: even in vacuum, there is a transfer between

the light source and the observation device, with a delay of half a cycle. Therefore, the measured speed of light will be slightly lower than actual Coulomb force interaction speed.

In short, there are only three main factors that determine the speed of light. These three factors have fully proved that the speed of light cannot be constant.

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Due to my lack of English ability, the Chinese to English translation was achieved through common software. Therefore, the English version is likely to have more inaccurate and not easily understood parts. In order to facilitate the review of the manuscript by experts, the original Chinese version is attached. Please accept my apologies for any inconvenience.

再议光和光速的本质及决定光速的主因

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[文章摘要]：本人通过数十年的努力，总共写了超二百篇物理学方面的文章，其中有超过一半讨论的问题与光有关。总算功夫不负有心人，最近的几篇文章把光的本质搞清楚了，如此同时，也把光速的本质弄明白了。光的本质是正在发光的（准确地说是正在以可见光频率振动的）以原子为基本单位组成的物质产生的库仑力的矢量叠加结果，当其强度的变化频率位于可见光范围并达到人眼可识别程度时，就会被人眼看到其正在发光。而光速的本质是正在发光的以原子为基本单位组成的物质的振动状态的传递速度。本文就此进行总结性论述。

一、光的本质及其主要理由与依据

1、光的本质简述

光的本质是正在发光的（准确地说是正在以可见光频率振动的）以原子为基本单位组成的物质所产生的库仑力的矢量叠加结果。当其强度的变化频率位于可见光范围内且强度达到人眼可识别程度时，这些发光物质就会被人眼看到，这就是所谓的可见光。而当其强度的变化频率在可见光频率范围内的强度不足以被人眼识别时，就是黑色的。当在可见光频率范围内的不同频率段的强度不同时，就会呈现出不同的颜色。

2、证明光的本质的主要理由与依据

2.1、人眼看到的对象是正在发光的、以原子为基本单位组成的物质，而非所谓的光

本人在《人类看到的到底是什么？——从两幅与光有关的高速摄影动图说起》（<https://www.toutiao.com/article/7289745544258273850/>）、《能被人类看见的对象到底有哪些？》（<https://www.toutiao.com/article/7292737425825235495/>）、《全反射条件下的点光源成像实验及其结果分析》（<https://www.toutiao.com/article/7503074623932858920/>）和《近全反射情况下镜面上点光源反射点各向可见说明了什么？》（<https://www.toutiao.com/article/7505255929185780275/>）等文章中明确得出结论：人眼看到的是正在发光的、以原子为基本单位组成的物质，而非所谓的光。

2.2、人眼从未看到过非原子组成的物质

截止目前，还没有任何一例人看到的是非原子组成的对象。实际上，也包括所有的视讯设备也从未记录到过非原子组成的对象。所有物理实验中，为了观测到各类非原子组成的对象，都需要用由原子组成的探测装置来实现观测。如：云室、晶体、水等液体检测装置，其观测的对象均为以原子为基本单位组成的物质。

2.3、太空中位于太阳光直射范围内的宇航员看到其周围为漆黑一片

位于太空中的太阳光直射范围内的宇航员看到的景像并非阳光明媚，而是漆黑一片的事实直接证明：人眼看到的并非所谓的光，哪怕太空中的太阳光比地面上的强得多也是看不见的。

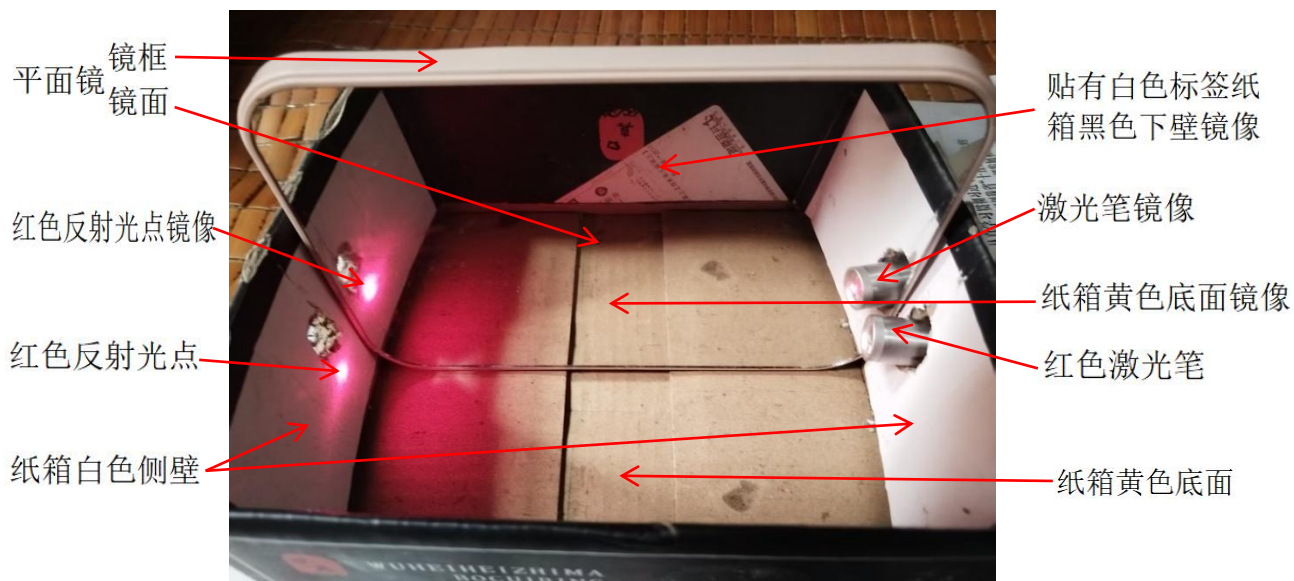
2.4、地球夜空在没有外光源和月亮时为漆黑一片

在没有月亮的地面夜晚，若周围没有地面照明设备时，夜空是漆黑一片的，夜空上方的太阳光并不能被看见。而只有当月亮位于上空时才会在太阳光的作用下产生次生光照亮地面并被看到。

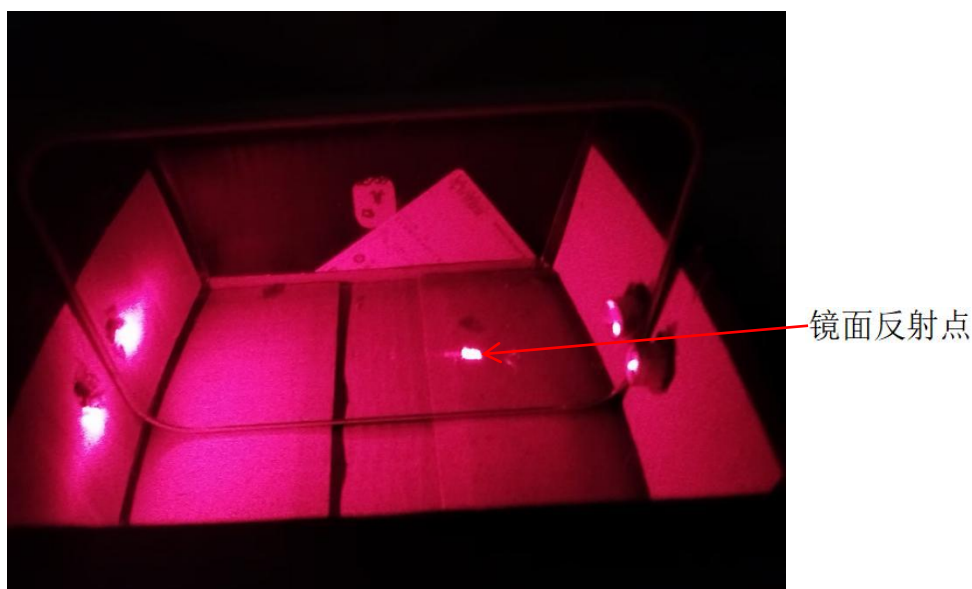
2.5、地球晴天的天空多为蓝天白云，太空中的宇航员看到的地球也是蓝色+白云

这一现象证明：地球人和宇航员看到的是同一发光体：大气层中正在发光的电离层和白云。

2.6、唯一单色光源时不同颜色的物体表现出不同的颜色并遵循力的矢量叠加原理



照片一：纸箱中部立一平面镜、右侧一红色激光笔照射到镜面中部并反射到左侧



照片二：与照片一对应时的暗室中的照片

当照片一中的实验装置放置到暗室时，就可以得到照片二。从照片二可知：在唯一红色光源照射下，不同颜色的物体的颜色并非均为红色，而是呈现出其在自然光下的颜色与红色的矢量叠加效应：当红光强时，呈现红色（如左侧壁和左侧三分之一箱底）；当红光弱时，呈现本

色为主（如右侧三分之二箱底、右侧壁和下壁镜像）。

2.7、近全反射条件下镜面反射点光斑各方位和方向可见且强度基本相同

照片二中的镜面反光点处的光斑在可直视此点的任何方位和方向上都能被看到，且其亮度基本一致。由于该照片的条件几近全反射条件（平面镜的反射率在 90% 以上，当入射角大于 85 度时，其反射率应该更高），如果光是光子或电磁波，则激光笔产生的光应该基本上被反射到左侧去了，其他方位和方向上几乎不会有反射或散射光才对。但照片二直接否定了此种可能性。这足以充分证明：人眼看到的是正在发光的物质，而非所谓的光。

2.8、人眼不可能看清楚高速运动的对象直接证明人眼看到的不可能是光速运动的光

人眼看东西时会出现视觉残留，当画面大于每秒 25 帧时就会形成连续动作。因此，人眼不可能看到光速运动的任何东西，包括所谓的光本身。

二、光速的本质及其主要理由和依据

1、光速的本质简述

由于人眼看到的是正在发光的物质，因此，所谓的光速应该是正在发光的物质间的发光状态的传递速度，就如水波和声波的速度一样是水分子和空气分子振动状态的传递速度，而非水分子或空气分子的运动速度。

2、证明光速的本质的主要理由与依据

2.1、光的本质决定了光速的本质只能是发光状态的传递速度

由于光的本质是以原子为基本单位组成的物质正在以可见光频率振动并产生相应的库仑力，该力自然会作用于其邻近的其他以原子组成的物质并使其也发光（所谓的光的反射、散射、折射、透射、衍射、绕射均是因被作用的原子被动发光而产生的次生光/库仑力）。

2.2、光速在不同介质界面处突变甚至是突增证明光速的本质只能是发光状态的传递速度

光在不同介质界面处的速度会发生突变，甚至是突然增大的现象是用光是光子或电磁波均无法解释的。如：从玻璃中射入空气中的光速是从玻璃中的约每秒 20 万千米突增到每秒约 30 万千米，同时方向也会发生突变。介质界面处只是不同原子的接触面而已，不可能有能力使光子或电磁波突然大幅度增速同时变向。否则，均匀介质内部的原子也应该会使光子或电磁波变速并变向。但实际情况是均匀介质中的光速基本恒定。

2.3、光速在不同介质中的速度与介质的密度一般反相关证明光速的本质只能是发光状态的传递速度

由于发光状态在两个发光体间的传递存在延时（所谓的半波损失就是这一延时的结果。当把一定频率振动的原子视为同频率的电偶极子时，其产生的库仑力最大值与电偶极子的电偶极

矩最大值同步，但库仑力对相邻原子作用并使其电偶极矩达到最大值的时间会存在半个周期的差别。这才是所谓的半波损失的根本原因。本人在《反射光存在的半波损失现象的机理及其物理意义》（<https://www.toutiao.com/article/6943141929446048260/>）有较详细的认证），单位长度内的原子数量越多，传递延时就越大。所以才会出现密度越大，光速越低的现象。

2.4、不同频率的光在同一介质中的速度不同证明光速的本质只能是发光状态的传递速度
一般均匀介质中的光速随入射光的频率成反相关变化：频率越高、光速越低。这可能是因为不同频率的光在介质中的发光状态传递中的延时与频率正相关。频率越高的延时越大，从而传递速度越小。

三、决定光速的主要因素简析

在本人的《以决定波速的主因为基础推断决定光速的主因的尝试》（<https://www.toutiao.com/article/7305684461344621106/>）和《决定光速的主要因素分析及光速计算方法简析》（<https://www.toutiao.com/article/6836653627369587203/>）等文章中明确指出：决定光速的主因有三：一是真空中静止光源产生的光之速度 C ；二是光在介质中单位长度内的再生次数 N 或延时总量 Δt ；三是光源相对观测者的运动速度 U 。而在本人编写《真空磁导率的精确计算方法及简化计算结果的物理意义》（<https://www.toutiao.com/article/7477025901063209509/>）时发现：只有假设相对运动的带电粒子间的库仑力相互作用速度与其运动状态有关时，才能得到真空磁导率理论计算值与实测值接近。如果假设库仑力的相互作用速度与带电粒子的运动状态无关时，真空磁导率的理论值接近于 0！这从一个侧面证明：库仑力相互作用速度与带电粒子间的相对运动状态直接相关。

虽然本人的上述两篇文章中对决定光速的主要因素的分析基本符合事实，但还不严谨。准确和严谨的说法应该是：决定光速的三个主因是：一是真空中静止带电粒子之间的库仑力相互作用速度 V ；二是单位长度内发光状态的传递次数 N ；三是光源相对观测者/观测装置的运动速度 U 。

真空中实测到的静止光源的光速与库仑力相互作用速度存在一点差异：即使是在真空中，光源与观测装置间也存在一次传递，有半个周期的时延。因此，实测到的光速会稍低于实际库仑力相互作用速度。

总之，决定光速的主要因素只有三个。这三个因素已充分证明：光速不可能恒定不变。

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