DARK MATTER
the new research direction

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***Abstract**: - The speed of light coming from space seems so unequivocal that we do not pay attention to its confirmation, even though it has not yet been measured*[i].

The lecturers do not prove the speed of light coming from space with a measurement. This speed is hypothetical. We rely on various phenomena showing us that the speed of light in a vacuum is always the same, but this can be misleading.

Measurements of the speed of light from space are feasible. The measurements described below can be performed by any better equipped astronomical observatory. It needs just the existing equipment of the observatory.

Perhaps this measurement can change our view of the universe and may explain the existence of dark matter. So far, actual dark matter research has not yielded noticeable results. This may mean that we are researching in the wrong direction. If we research in the wrong direction, we will not get the result despite great efforts.

Key-Words: *dark matter, Fabry–Pérot interferometer, diffraction grating, light form space, speed of light, properties of light*

1 Introduction

The article describes the measurement of the speed of light from space. The article consists of three parts:

- Overview and description of the used measuring methods and instruments,
- Description of the measurement of the speed of light arriving from space and
- Reflection on the measurement

In the *Overview of the used measuring instruments*, the used instruments are described, including the specific requirements for using these instruments. It also describes how these instruments respond to sunlight.

In *Description of the measurement*, the measurement of the speed of light from universe is described, including the expected results based on already known similar measurements.

In the chapter *Reflection on the Measurement*, the possible consequences of the measured results are shown, including the possibility of explaining the dark matter.

2 Overview and description of the used measuring instruments

2.1 A rotating prism

A rotating prism *(Fig. 1)* can measure the speed of light from space. The light reaches the prism, where it is reflected to the mirror, returns to the rotating prism, and is then reflected to the eye. The beam is noticeable if the prism turns to the next surface during the beam's journey to the mirror and back. Based on the distance from the prism to the mirror and the speed of rotation of the prism, we can calculate the speed at which light travels between the prism and the mirror.

2.2 Measuring the speed of light from the Sun

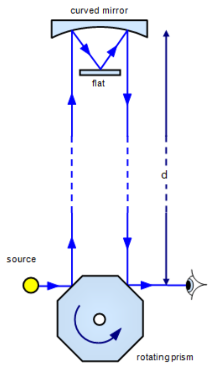

Fig. 1

Light speed meter based on a rotating prism.

The curve 'b' in Figure 2 shows the expected measured result when we measure the speed of light coming from the Sun. In the same figure, the narrow curve 'a' shows the speed of light emitted by a stationary laser.

When we measure light coming from a stationary laser, we measure a very narrow line at the position of the speed of light.

But when we measure light from the Sun, the curve is extended. The curve 'b' can be understood as a display of a multitude of different speeds of light that occur more or less frequently.

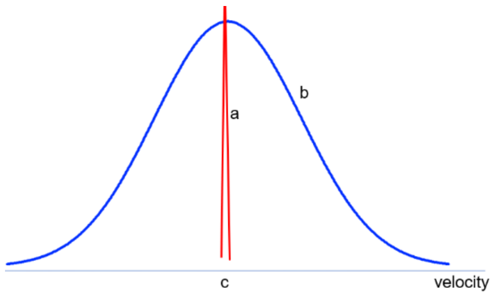

Fig.2

Photons from the Sun arrive at different speeds. The speed distribution is shown in the diagram.

Based on the measurement results, we can identify two postulates:

P1 *- Light from the sun has a range of different speeds and*
P2 *- The mirror on the rotating prism does not change the speed of light.*

2.3 Diffraction grating

A diffraction grating (transparent) is a tile that has many, even hundreds of slits per millimeter. Light passing through the grating is observed. The wave arriving to the grating changes direction after passing the grating. On the other side of the grating creates an interference image, which makes it possible to measure the wavelength of light.

Let's take a look at an unknown property of the diffraction grating. A diffraction grating can be installed in front of the rotating prism.

If we measure the speed of light without an in front added diffraction grating, we measure the already mentioned speeds of light as shown by curve b in the Figure 2. However, if we add a grating in front of the rotating prism, we notice that only light with speed c comes out of the grating, as for example shown in diagram a in the Figure 2.

The conclusion can be written in the form of the next postulate:

P3 *– The diffraction grating adapts any speed of light arriving at the grating to the speed determined by the constant c.*

3 Measuring the wavelength of light

Let's look at the measurement of the wavelength of light. We have to pay attention to the following: different measuring instruments show different measurement results.

By measuring the wavelength of light, we can use an interferometer, for example an Fabry–Pérot interferometer, or a diffraction grating.

In the case of measuring the wavelength of a spectral line in light from the Sun based on a diffraction grating, we observe a variety of wavelengths, depending on the speed of the particles in the Sun that emit light, as shown in diagram 'e' in the Figure 3. The range of wavelengths obeys Doppler's law.

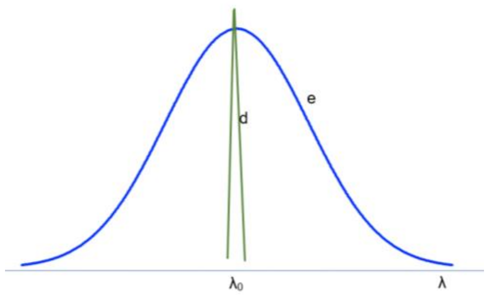

Fig. 3

Distribution of measured wavelengths in light from the Sun.

In the case of measuring the wavelength of light based on the Fabry–Pérot interferometer, we detect the very narrow band of wavelengths of light, which corresponds to a stationary light source and is shown by diagram 'd' in the Figure 3. The wavelengths are not the same, but the curve 'd' shows a narrow band, which is not created by different particle speeds but by different particle accelerations.

Selection of Fabry–Pérot interferometer

The Fabry–Pérot interferometer is sometimes supplemented with one or another grid. For the purposes of this measurement, the Fabry–Pérot interferometer must not contain any grating. We are comparing the effects of the grating and the interferometer on the light, so any grating built into the Fabry–Pérot interferometer would corrupt the measurement results.

In a Fabry–Pérot interferometer, the 'grid' sometimes cannot be completely avoided. Each bracket or gauge edge responds similarly to the grid.

Based on the presented measurement results, we can identify the postulate:

P4 *- The speed of the light source does not affect the wavelength of the light.*

2.2 Similar known measurements

Different particles or areas[ii] on the Sun have different velocities[iii] relative to the Earth.

The Fabry–Pérot interferometer does not detect different wavelengths of light in light from the Sun due to the different velocities[iv]. This shortcoming is bridged by diffraction grating based measurements. The speed of the light source can be measured by a diffraction grating[v].

Astronomers sometimes notice that they cannot measure the speed of objects in space with Fabry–Pérot interferometer, but they do not pay attention to this. They simply choose another measuring instrument. The velocities of bodies in space can be namely measured with a diffraction grating.

Comparison of measurements with a diffraction grating or Fabry–Pérot interferometer is not highlighted in the literature. We recognize it based on the study of many other measurements.

Many examples of similar measurements show that diffraction grating changes the wavelength and velocity when the light comes from a moving light source[vi].

4 Measuring the speed of light from space

The described measurement results are derived from already known measurements, but it makes sense that the measurement results are confirmed once again with measurements carried out for this purpose.

4.1 Let's repeat the measurements

In the repetition of the measurement, we measure the wavelength of light coming from a moving light source in space. We direct the light into the diffraction grating so that it travels through it.

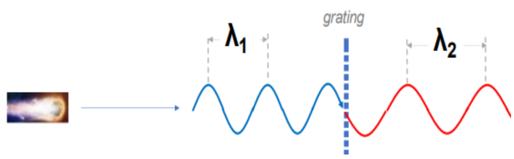

Fig. 4

The path of light from the moving light source through the diffraction grating to the target.

The wavelength of the light is measured for the first time before the light reaches the grid (λ_1) and for the second time after the diffraction grating, when the light has already passed the diffraction grating (λ_2).

Physical science explains that the wavelength of light does not change when it passes through a diffraction grating, but known measurements do not confirm this opinion[vii]. Such a measurement is simple, but has not yet been done.

4.2 Measuring the frequency of light

In physics, the frequency of light is not measured yet. There is even a belief that the frequency of light is not measurable. Let's take a look at measuring the frequency of light.

Regardless of what a speed of light is in front of the grid, the grid restores the speed to the constant c. The speed of light behind a stationary grating is measurable[viii] and is determined by the constant c.

Behind the grating, the known speed of light c and the measured wavelength λ_2 enable the measurement of the frequency of light $f = c/\lambda_2$.

4.3 Measuring the speed of light

The frequency of the light in front of the grating is the same as the measured frequency of the light behind the grating.

In front of the grid, we can measure the wavelength of light λ_1.

The speed of light in front of the grating is equal to the product of the measured frequency and the wavelength of light in front of the diffraction grating λ_1. The speed of light in front of the grid is $f.\lambda_1$.

5 Reflection on the Measurement

5.1 Why this article?

The question arises, why write an article about the measurement before final measurements. It would make sense to do the measurement first and then publish the measured results.

When I think about it, I realize that only the measurement is undemanding, but it is not simple to write and publish an article about the results.

5.2 History of similar measurements

This measurement can be done quickly. However, there are no records of such or similar measurements.

What measurement result can we expect? The measurement either proves that the speed of light is always the same in a vacuum, or it denies the hypothesis of the speed of light. Deciding on such a basic question is too difficult for many of us.

Some authors have already encountered this issue. This was especially the case when one type of measuring instrument did not show the expected results and they had to change the measuring instrument[ix] to confirm the expected measurement results.

Some measurement operators have been already close to such a measurement. They avoided the interpretation of the results of their measurements by explaining that they are not researchers, but only educators.

5.3 Consequences of publication of measurement results

On the diffraction grating, the wavelength of light maybe changes, but its frequency does not. This means that the speed of light maybe changes on the diffraction grating. The measurement therefore shows that the speed of light in a vacuum is not always the same.

In physics, several theories are based on the assumption that the speed of light is always the same in a vacuum. The different speeds of light therefore cast doubt on the theory of relativity, the big bang, dark matter, and more.

5.4 A sociological-psychological view of measurement

Physical theories are not without emotional charge. Perhaps the measurement will require a change in today's views on physics. It may even require changes in the very foundations of physics. The measurement may be sobering.

The measurement is not technologically demanding, but it is stressful. We perceive the speed of light as the foundation of science. Any different thought excites us.

When we realize that the speed of light from space can be measured, we are tempted. Either measure the speed of light, or insist on an agreed but unmeasured hypothesis.

If we finally decide to measure the speed of light, we encounter another problem. How to disseminate measurement results that are different from their expectations among physicists. How will they react to such news?

Therefore, for this measurement, a suitable time will have to come, which will be ripe for facing the results of the measurement.

6 Conclusion

The described measurement may not bring new insights, or it may deepen the understanding of light. A fresh perspective of understanding light can clear our view on the universe. Dark matter may no longer be necessary to understand the universe.

The paper encourages the wider physical environment to join the measurement.

We need to overcome the polarization of views. Some believe that the diffraction grating affects the wavelength of light coming from a moving light source. Others believe that the grating does not affect the wavelength of light.

In physics, measurements are the only way to judge views. This measurement is feasible in many places with a small investment.

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