

A WRONG FORMULA OF FIZEAU

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Abstract: The experiment of Fizeau has nothing to do with the theory of relativity.

Examination

Fizeau's experiment with moving water^[1] is one of the most important for the theory of relativity. The results of this experiment are confirmed repeatedly, albeit partially. Dephasing of the rays is a fact, but Fizeau's formula for it is wrong and that's why the calculations do not match the data.

The correct formula that follows from the classical law of velocity-addition and that should Fizeau use is:

$$D = c' \cdot \left(\frac{L}{c' - v} - \frac{L}{c' + v} \right) \quad (1)$$

D - dephasing

c' - speed of light in water

L - water flow path

v - water flow velocity

The same formula follows also from the effect of Doppler. Or the equivalent formula:

$$D = L \cdot \left(\frac{c'}{c' - v} - \frac{c'}{c' + v} \right) \quad (2)$$

Whereas Fizeau uses the formula:

$$D = L \cdot \left(\frac{c}{c' - v} - \frac{c}{c' + v} \right) \quad (3)$$

c - speed of light in vacuum

He replaces *c'* with *c* but this is unnecessary, because there is no vacuum in his device and in principle the entire experiment is in water, i.e. it's a standard situation with a double Doppler effect. A similar error with *c* is made afterwards by the relativists too. Moreover the dephasing calculated with the classical formula, almost coincides with the newer experimental data, while the calculated dephasing by Fizeau is about a quarter bigger and does not match the data. The effect of Fizeau is simply a Doppler effect in water that is not correctly calculated. All in all the classical physics is enough and the relativistic hypotheses are meaningless.

Reference

[1] Fizeau, „On the Effect of the Motion of a Body upon the Velocity with which it is traversed by Light.“, 1859.