Einstein's Rotating Disk

The Wrong Approach to The Right Theory

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Abstract

It is shown that by applying a simple and correct method of measurement of the circumference the space in rotating disk is flat.

Introduction

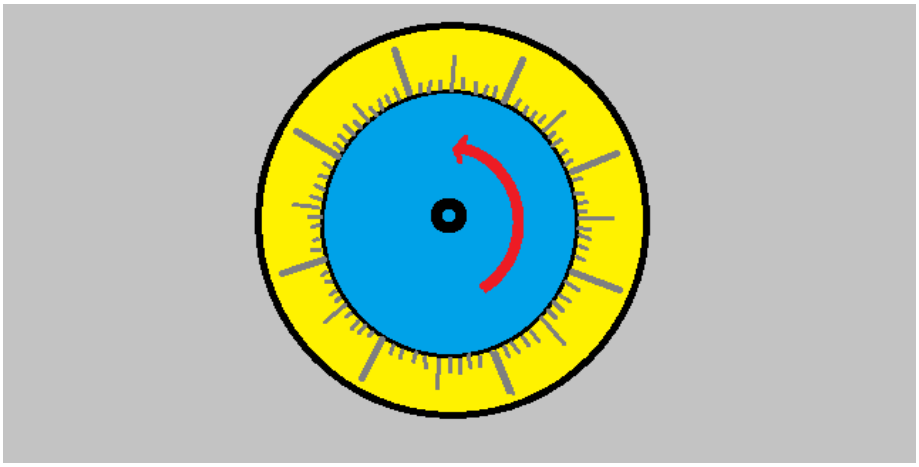
The rotating disk thought experiment is usually cited for its historical role in transition phase between special relativity and general relativity and as an effective method to introduce the idea of the non-Euclidean geometry as a necessary requirement to understand some cases.

Despite its great popularity it is possible and easy to show that the real result of this thought experiment is less significance than often assumed .

The Rotating Disk and The Correct Way of Measurement

In his *The Meaning of Relativity* Albert Einstein used the equivalence principle and the assumption which he thought to be a result of the rotating disk thought experiment that the space of a rotating disk is curved to assert his great idea that in the presence of a gravitational field the geometry is not Euclidean. The method used in this thought experiment as described by Einstein for measurement is to have a large number of short rigid rods laid in series along the circumference and the diameter of the disk to find the ratio of the two lengths which should be greater than (Л) for the rotating disk because of Lorentz contraction according to his analysis .

The fact that no Lorentz contraction exists on the rotating disk circumference can be shown easily by *using a single measuring rod with the same shape as the object of measurement as appeared in our static frame of reference* and thus avoid the risk of using the assumption that a rotating circle can be thought of as large number of short straight lines moving instantly in constant motion and the complications associated with adding together the length of infinite number of rods.



This simple method of measurement enables us to directly deduce that for the rotating disk the circumference length to diameter ratio is (Л) because the circumference and the diameter of the rotating disk coincide with the circumference and diameter of our circular measuring rod and thus the space in the rotating disk is flat.

Conclusion

The rotating disk thought experiment can not serve as an example of the need for non-Euclidean geometry even though played a role which is completely false yet very fruitful during the construction of general relativity.