A simple formula that allows calculating the scalar curvature of the trajectory to a point in space-time located at a fixed distance from a point mass

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Abstracts

A formula that allows calculating the scalar curvature of the trajectory of a point in space-time, in the case of a gravitational field caused by a point mass, through the values of mass and spatial distance.

Keywords

Cosmology, general relativity, curvature of space-time, energy density of the vacuum field.

1.- Introduction

Starting from a point mass "M" we study the curvature of the trajectory in space-time of a point away from the mass a distance "r"

2.- Training the formula

According to rational mechanics, the centrifugal acceleration to which a mobile is subjected that travels around a curve at a speed "v" in a trajectory with a radius of gyration R, is given by:

$a =- v^2/R$

According to the general theory of relativity, the gravitational field is created due to our motion in curved spacetime, just like centrifugal force when we are traveling in a car around a curve. If, as we know, space-time moves at a speed of module "c", an observer who is at rest near a mass will be subjected to a gravitational field created by that mass "M", a field that curves space -time, and will experience, due to the speed "c" of space-time and the curvature of space-time, a centrifugal acceleration "a" given by:

$a = c^2/R$

where R is the radius of curvature of the path of that point in space-time.

The force to which it is subjected is given by

$F = mc^2/R$ (1)

This force to which it is subjected is experienced as a gravitational force and according to Newton's theory of gravitation it is also expressed as

$F = -G\, M.m/ r^2$ (2)

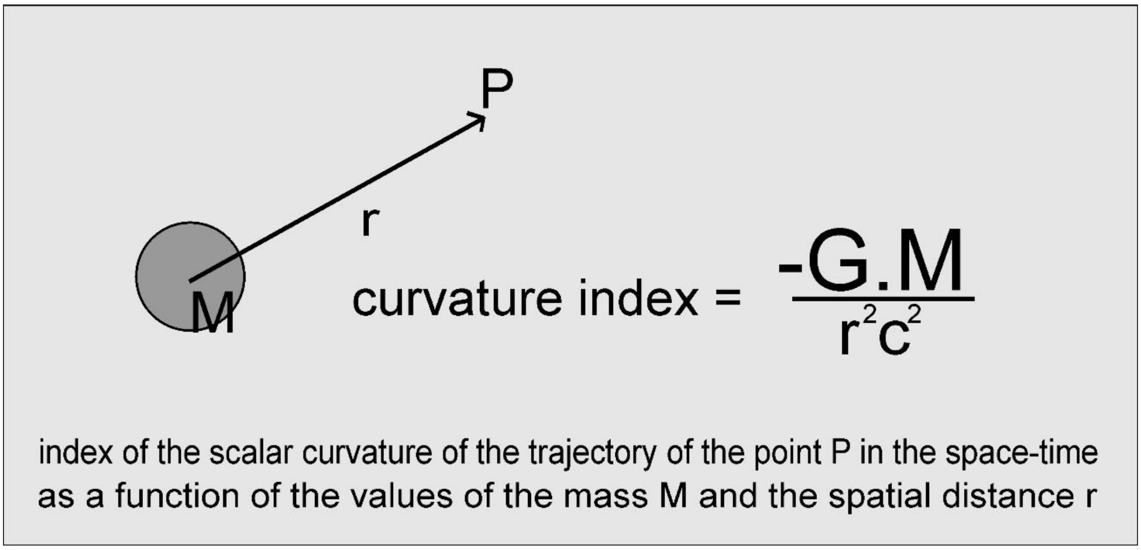
Where G is the universal gravitational constant.

Equating the two expressions (1), (2) we obtain

$$\mathbf{1/R = -GM/(r^2c^2)}$$

1/R turns out to be the index of the scalar curvature of the trajectory in space-time from a fixed point at a distance "r" from a point mass M.

A formula that allows us to calculate the scalar curvature of the trajectory in space-time of a point, at a spatial distance "r" from a point mass "M", based on parameters that are easy to determine, such as mass and spatial distance.



3.- Conclusions

For an assumption of a point mass, a simple formula has been obtained that allows calculating the index of the scalar curvature of the trajectory in space-time of the point (t,r), where r is the spatial distance to the mass "M" that is causing that curvature, depending on that distance and the value of that mass.