Gauss Law of Gravitation under Collision-Space-Time

Espen Gaarder Haug
Norwegian University of Life Sciences, Norway
e-mail espenhaug@mac.com.

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Abstract

In this short note we present the Gauss law of gravitation, based on that the mass is collision-time, see our paper Collision Space-Time, [1].

Key Words: Newton gravitation, Gauss law, standard theory, collision space-time theory.

The Gauss Law of Gravitation

The Newton [2] law of gravitation is normally given by

$$F = G\frac{Mm}{r^2} \tag{1}$$

this even if Newton never introduced nor described a gravity constant, see [1]. The Newton law of gravitation has a corresponding Gauss law of gravitation that we here will look at.

The Gauss law of gravitation when we use the standard (incomplete) mass definition is the well known formula

$$\nabla \cdot \boldsymbol{g} = -4\pi G\rho \tag{2}$$

where ρ is the mass density and $\boldsymbol{g} = -\nabla\phi$, where ϕ is the scalar field, so we get the well known formula (Poisson's equation)

$$\nabla^2\phi = 4\pi G\rho \tag{3}$$

while under collision space-time we get

$$\nabla \cdot \boldsymbol{g} = -4\pi c^3\rho \tag{4}$$

where ρ is the mass density and $\boldsymbol{g} = -\nabla\phi$, where ϕ is the gravitational scalar field, so we get (Poisson's equation)

$$\nabla^2\phi = 4\pi c^3\rho \tag{5}$$

In collision space-time it is important to have in mind that the mass is defined as collision-time, namely $\bar{M} = \frac{l_p}{c}\frac{l_p}{\bar{\lambda}}$, where l_p is the Planck length, that can be found independent of G, see [3], further $\bar{\lambda}$ is the reduced Compton wavelength, and c is naturally the speed of light (gravity). We also have that $GM = c^3\bar{M}$ as discussed by [3]. Our new Gauss law formula of gravitation however give very different interpretation than the standard view, it is now at least partly compatible with quantum gravity as all masses contain the Planck length, further it seems like the speed of light now plays a central role in Newtonian gravity as seen from this angle.

References

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