

# Einstein's Spook

by Paul R. Gerber

Gerber Molecular Design, Forten 649, CH-8873 Amden

Email: [Paul.Gerber@moloc.ch](mailto:Paul.Gerber@moloc.ch)

95.30.Sf      Relativity and gravitation

04.30.-w      Gravitational waves

## ***Abstract***

The common tests of the weak equivalence principle not only deal with the acceleration of masses, but include, in principle, the simultaneously occurring emission of a gravitational wave, even when it is far too small to be observable. Einstein's 'extension' of the weak equivalence principle ignores this tiny effect, and thus, corresponds to postulating an instantaneous action at arbitrary distances, and consequently, implies the absence of gravitational waves in the theory of general relativity.

## ***Stating Einstein's equivalence principle***

The theory of General Relativity (GR) is based on Einstein's equivalence principle [1] which argues that in a state of free fall one cannot distinguish whether one is accelerated by a constant gravitational field or is at rest in a field-free space. An equivalent formulation compares an isolated laboratory which is at rest on the surface of the earth with an identical one which is accelerated correspondingly at a constant rate, such as by the propulsion of a rocket. The equivalence principle states here that it is impossible to decide within the laboratory which of the two situations applies.

## ***Critique***

That this principle cannot strictly be valid shows the following consideration. To the person in the earth-bound laboratory belongs its own gravitational field which in the situation at rest extends (ideally) to infinity and diminishes proportional to the inverse distance squared. In the second situation the person is accelerated and so should be its gravitational field out to arbitrary distances, in order to fulfill Einstein's equivalence principle. This would correspond to a 'spooky action at a distance' as Einstein formulated himself in the context of quantum mechanics (QM); and he used this argument to reason against QM being a final theory. Equally, it is clear that an action at a distance cannot keep the gravitational field of the accelerated person in his momentary inertial rest-system at the values one would expect it to assume by transferring the corresponding values from the situation at rest. Correctly, the field experiences a local push which propagates as a wave in order to reestablish the field to values as requested by Einstein's equivalence principle. Of course, the propagation speed is limited by the speed of light as stated by the theory of Special Relativity.

In the argumentation to develop GR, the gravitational field of the experimenter does not occur at all. But obviously, Einstein expected that gravitational waves would follow naturally from his theory as is the case in Electromagnetism. However, to find these waves proved to be a thorny procedure [2,3] and he later retracted his corresponding derivations [4]. That this retraction was justified proves the finding,

that the corresponding postulated waveform violates simple symmetry requirements [5].

## ***On Tests of the Equivalence Principle***

A common argument in favor of GR is the experimental verification of the equivalence principle. These experiments compare different materials in gravitational- and Coriolis fields and yield confirmation of the equivalence principle of one part in  $10^{15}$  [1]. However, because the self-field and the acceleration-generated wave field must be proportional to the test mass, such experiments are incapable of separating out the effect of emitted gravitational waves. There seems to be little hope for a eventual experiment which measures directly the contribution from the emitted gravitational wave of a accelerated experimental mass. However, for the acceleration of Mercury in the Sun's field we can see the effect by Mercury's perihelion precession which occurs, because Mercury is constantly slowed down by the emission of a gravitational wave. For a circular orbit this slowdown is less evident since it only shows up as a slow decrease of the orbital radius. This slow-down should also be expected in GR and it would spoil the nice agreement obtained by Schwarzschild's conservative orbit (see [6]).

## ***Retardation***

As we know from Electromagnetism, emission of radiation is explained by the retardation effect, namely, that the field produced by a accelerated charge propagates at finite speed. More difficult to understand is that a static (electric) field is also subject to retardation, i.e. that it can only extend its action at a finite speed. That this is truly the case follows from quantum field theory, which explains such a field not as static but as a stationary one [7]. It is a counter-flow of photons and anti-photons of locally equal flow strength, a configuration that produces no energy flow. Gravity must be understood along the same line, and the first step in this direction has been done by Gerber [8] who explained the perihel precession of Mercury by the retardation of the Sun's gravitational field.

## ***Conclusion***

This note reaches it's purpose, when the Physics community is ready to accept that GR must be amenable to being questioned, and this must include fundamental questions, like the one presented here [9]. The geometrical view of the Universe as formulated by GR has led eventually to the very unsatisfactory concept of multiverses, which leaves no hope to ever understand fundamental parameters like masses of elementary particles and their interaction constants. In following up the route initiated by Gerber [8] the prospect becomes much more bright. There are no free parameters at all, and there is a real prospect to calculate fundamental quantities like, for instance, the masses of leptons [7].

## ***References***

1. [https://en.wikipedia.org/wiki/Equivalence\\_principle](https://en.wikipedia.org/wiki/Equivalence_principle)
2. Einstein A., Sitzungsberichte der Koeniglichen Preussischen Akademie der Wissenschaften, part 1, 688 (1916), 154 (1918)
3. Miesner C. W., Thorne K. S., Wheeler J. A., (1973), "Gravitation", W. H. Freeman, New York
4. Kennefik D., (2007), "Traveling at the Speed of Thought", Princeton University Press
5. Gerber P. R., (2020), "On the Polarization of Gravitational Waves", <http://vixra.org/abs/2001.0398>
6. Gerber P. R. (2015), "What's Wrong with General Relativity? (2)",

- <https://vixra.org/abs/1506.0038>
7. Gerber P. R., (2019), “On Quantum Field Theory and Gravitation”,  
<https://vixra.org/abs/1911.0010>
  8. Gerber P., (1898), Zeitschrift fuer Mathematik und Physik. 43, p. 93–104; english translation:  
<http://www.alternativephysics.org/gerber/Perihelion.htm>
  9. McCausland I., (1999), J. of Scientific Exploration 13, 271, [link](#)