On Damping of Light in Cosmos and the Quasar Misunderstanding

by Paul R. Gerber

Gerber Molecular Design, Margaretenweg 14, CH-4310 Rheinfelden

Email: Paul.Gerber@moloc.ch

98.54.Aj Quasars

95.30.Sf Relativity and gravitation

Abstract

Electromagnetic radiation in space experiences damping as it moves through the universe [1]. We argue that the damping rate must behave according to the square of the frequency in the low frequency limit. Correspondingly, the supposedly high-intensity radiation of quasars at radio frequencies must, on the one hand, be a misinterpretation originating in the much lower damping rate compared to that of visible light. On the other hand the incorrectly pretended expansion of space, claimed by General Relativity, erroneously supposes an additional weakening of radiation of distant sources.

Invalidity of General Relativity and of Hubble-Lemaitre's "Law"

Einsteins original "Gedanken-Experiment" reads: "In a laboratory without contact to the outside world one cannot decide whether (a) the measured weight of a macroscopic test body originates in the attraction by the earth's gravitational field, g, or (b) is caused by constant acceleration of the laboratory by an amount g (e.g. by a rocket) in a space without any gravitational field present."

We have repeatedly pointed at the main defect of General Relativity (GR) [2], namely, that the test body's weight measured in case (a) differs by a tiny amount from the force provided by the rocket in case (b) though this may be below measurably in the given setting. The cause of this difference originates in the theory of special relativity which states that nothing, including rest-mass-free fields, can propagate faster than with the speed of light. Thus, our test body in case (b) is constantly accelerated out of its own gravitational field and consequently experiences a small decelerating force by just this (slightly trailing) field. Hence, in the co-moving frame the fields for this body's corpuscles deviate from the rotational symmetric $1/r^2$ law by a tiny amount, where r is the distance from the corpuscle. This is in contrast to Einstein's postulate.

To state it more explicitly, GR implies that a body's own (self-generated) gravitational field moves uniformly with the body at all distances and for all forms of movement. For accelerated movements this corresponds to an (incorrect) infinite propagation speed of the gravitational field. Of course this "feature" questions the validity of the whole theory of GR, or invalidates it actually.

As an extreme example, if GR's "Gedanken-Experiment" were correct, the gravitational fields of two neutron stars, which circle around each other at close distance, would just synchronously circle around at all distances without emitting any energy whatsoever. This is in blatant contrast to observations.

Actually, such a pair of neutron-stars emits enormous amounts of energy which, in the final process, lets them unite within fractions of a second. This is verified beautifully by the LIGO experiment [3] which observes the gravitational waves emitted by the accelerations of two neutron stars that orbit around each other. These experiments are extreme illustrations of the consequences of GR's omission.

A further incorrect claim following from GR's view is the Hubble-Lemaitre "law" [4] which states that (at large scales) galaxies are supposed to move away from each other at a speed proportional to their actual distance. This claim originates in the erroneous idea, that there is no damping mechanism for electromagnetic waves in "empty" space [1], such that the cosmic redshift is considered to be a consequence of a continuous expansion of distance scales. GR's omission is a tiny, unmeasurably small effect in the (considered) case of accelerations at scales comparable to the weight on earth, but becomes a huge effect in the case of two neutron stars which circle each other at a distance comparable to their diameters. In this situation the emitted gravitational waves are so strong, that they carry away substantial amounts of the stars kinetic energy within fractions of a second, the time scales of the final collapse of tho neutron stars circling each other as determined by the above mentioned LIGO experiment [3].

The probably best-known result of GR is an explanation of the perihelion shift of Mercury's orbit around the sun (43 arc-seconds per century). However, this result actually (and correctly) follows from the concept of negative masses [5,6], which must occur in the spectrum of the time-translation operator but which are missing in GR.

A second incorrect claim of GR is the proposal of spin-2 quanta of gravitational propagation. Such excitations would necessarily have rest mass and move at a speed smaller than the speed of light [7]. Actually, gravitons have spin zero [6].

Damping of Light by Generation of Graviton Anti-Graviton Pairs

In a previous note [1] we have argued that the cosmological redshift is a damping effect caused by emission of tiny gravitational wave packets by light quanta along their paths. The reason for this emission is that light is persistently accelerated by the ever changing gravitational field along it's path and these changes in direction or wavelength must be accompanied by the generation of gravitational waves in order to obey momentum conservation. A consequence of these graviton-emission processes is that two galaxies showing equal redshift could be at completely different distances from the observer. This, because their two light paths towards the observer have in general very different acceleration sequences which will lead, in general, to completely different average color shifts per unit distance.

In the idealized but extremely unlikely situation that the gravitational field would not change along a single photons path, the photon would carry on along a straight line without any change in it's package of field distribution. In the realistic situation of a changing gravitational field along the photons path the photon is forced by the gradient of the gravitational field to perform tiny changes in direction (for a field gradient perpendicular to it's propagation direction) or tiny changes in color (for parallel components of the field gradient). In either case there is a change of the photons momentum which must be compensated by the generation of gravitons of appropriate momenta. Actually, every single process must produce a (graviton anti-graviton) pair in order to obey graviton conservation.

Now, gravitons and anti-gravitons are each present in a thermal background radiation which must be in equilibrium with the corresponding electromagnetic background radiation [8]. This latter has an observable blackbody spectrum of 2.725K. Owing to these population distributions of gravitons and anti-gravitons a photon looses some energy on average in these persistently occurring scattering events. This, because for gravitons, occupation numbers of states with energies below-equilibrium are high, and low for above-equilibrium states. This is the correct sequence of processes that leads on average to the red-shift observed in cosmological photons.

The case of Quasars [9,10]

Quasar is the name of stellar objects that, supposedly, emit enormous amounts of radiation in the radio frequency range. A particularly worrying feature is that the intensity of these objects seems to increase enormously with their distance. We argue that this "feature" derives from two incorrect concepts. On the one hand there is the erroneous idea of GR of a continuous expansion of space [11], which suggests a much too large distance of these objects. On the other hand (second point, treated in detail below) we argue that the observed high strength originates in the much lower damping rate of low-frequency radiation as compared to the one of light in the visible spectrum. (But as already mentioned, the concept of damping of radiation is missing entirely in GR.) These two features of GR make up the erroneous claim of an enormous radiation strength of quasars.

We want to dwell somewhat on the second point. While the gravitational deflection of light is independent of it's frequency, the gravitational damping of it may well show such a dependence. We suggest here a simple argument of mathematical nature. The damping force experienced by an object moving within a static environment is always directed antiparallel to it's direction of movement. Consequently, the damping rate is effectively a scalar quantity. As such, it's simplest leading analytical form for a solid body is a dependence on the square of it's velocity (i.e. momentum) within it's static environment. Because light quanta move at constant velocity the corresponding loss in energy must show up in a reduction of their frequency. Thus, when measured in the local (environmental) rest system, the cosmological damping rate of light quanta must depend on the square of their frequency in leading order.

Consequently, the very low frequency of quasar radiation is the correct reason for it's very low damping and thus for it's correspondingly high intensity observed at distances where optical signals are already considerably weakened.

Conclusion

GR attributes enormous radiation strengths to so-called quasars, galaxies which emit radiation in the frequency range of radio waves. This is an artifact which is based on two erroneous concepts of GR.

On the one hand, GR's claim of an expansion of space implies that the radiation has traveled unrealistically large distances. Therefore, the emission strength would have to be enormously large to enable the measured signals after an attenuation proportional to the inverse square of the traveling distance. Without such an expansion, the traveling distance is much reduced, a relative reduction which is the larger, the the farther away the emitter.

On the other hand the concept of damping is missing in GR. But in fact, electromagnetic radiation exchanges energy with the graviton radiation field by individual scattering processes. However, the exchange probability must depend on the energy of the produced photons. We argue that this probability behaves as the square of the photons energy in the low-energy range. This leads to enormously weaker attenuation of radio-frequency waves compared with the already extremely weak attenuation of visible light. Thus, radio-wave emitters appear additionally much more intense than emitters of optical signals.

These two reasons lead to the tremendous overestimate of the radiation strength of quasars.

References

1. Gerber P. R., (2022), Cosmological Redshift from Light Acceleration, viXra:2210.0118
2. Gerber P. R., (2015), What's Wrong with General Relativity?, viXra:1502.0067, viXra:1506.0038
3. https://en.wikipedia.org/wiki/LIGO_Scientific_Collaboration
4. https://en.wikipedia.org/wiki/Hubble's_law
5. Gerber P. R., (2013), Physics with Negative Masses, viXra:1303.0100
6. Gerber P. R., (2022), Mercury in a Quantum-Gravitational Field, viXra:2212.0038
7. Gerber P. R., (2019), On Quantum Field Theory and Gravitation, viXra:1911.0010
8. Gerber P. R., (2024), Zwicky's Coma-Observation and MOND, viXra:2404.0137
9. https://en.wikipedia.org/wiki/Quasar
10. https://en.wikipedia.org/wiki/List_of_quasars
11. https://en.wikipedia.org/wiki/Expansion_of_the_universe