Detected Gravitational Waves were not generated by Colliding Black Holes

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Abstract: The detail analysis of Gravitational Waves waveforms detected by LIGO observatory shows that the waves could not have been generated by colliding Black Holes. Most likely they were generated by colliding collapsed stars ("gravistars' or "collapstars", G-stars for short), which do not have Event Horizons. This is shown by using a simple model of a Sun mass G-star orbiting a G-star with a mass of 100 Suns. The evaluation is based on the comparison of two different metrics, the Schwarzschild metric, and the new metric derived by the author earlier, which provide the orbital frequencies as functions of a distance from the main G-star center.

Introduction: The recent announcement of detection of the Gravitational Waves (GWs) has generated much publicity and excitement. The details of the detection announcement can be found online in the LIGO Open Science Center [1]. More complete paper by B. P. Abbott et al. describing additional details has also been recently published and can be found on line [2]. The detection of GWs is a wonderful success and a significant progress in observational astronomy. Hopefully the accumulation of more data and additional analysis will show that the Black Holes (BHs) do not exist and the term BH has to be replaced by a new term such as G-star.

To show this in a complete generality of two massive G-stars colliding is not easy, it is therefore necessary to use some simplifications that will illustrate the problem and allow finding solutions. This author has previously derived equations for the relativistic Kepler's third law for circular orbits based on the two different metrics, the Schwarzschild metric and the author's derived new metric. The derivation was based on the assumption that a small test body is orbiting a star. It will, therefore, be assumed that if a Sun mass G-star orbits a G-star of 100 times the mass of the Sun the situation will be similar to the assumption for the derivation of the Kepler's third law and the disturbance of the Sun mass star on the main G-star will be small and can be neglected.

As the Sun mass G-star orbits the main G-star it generates GWs, which carry away the orbital energy. This energy loss results in the orbit getting closer to the main G-star and finally causing a collision. It is not easy to derive the complete equations for the radiated energy, but it is easy to find the orbital frequency as a function of a distance from the main G-star center. Assuming that the star orbital frequency is equal to the frequency of the radiated GWs the orbital frequency will thus provide an important characteristic property that should be observed in the detected GWs.

Mathematical background: In the previous publication [3] the author has derived the relativistic Kepler's third law formulas for circular orbits for the orbital time for the two different metrics; first for the Schwarzschild metric:

$$t_{os} = t_{nt} = 2\pi\sqrt{\frac{2r^3}{c^2 R_s}} \qquad (1)$$

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followed by the formula for the new metric:

$$t_{oh} = 2\pi\sqrt{\frac{2\rho^3}{c^2 R_s} + \frac{\rho^2}{c^2}} \tag{2}$$

where R_s is the Schwarzschild radius, c the speed of light and $\rho(r)$ the computed physical radius. These orbital times are the proper times which need to be referenced to the distant observer by adding the gravitation induced time dilation factor in order to obtain the formulas for the observed frequencies. The results are as follows:

$$f_s(r) = \frac{1}{2\pi}\sqrt{1 - \frac{Rs}{r}}\sqrt{\frac{c^2 R_s}{2r^3}} \tag{3}$$

for the Schwarzschild metric and for the new metric:

$$f_h(r) = \frac{1}{2\pi}\frac{e^{\frac{-R_s}{2\rho(r)}}}{\sqrt{\frac{2\rho(r)^3}{c^2 R_s} + \frac{\rho(r)^2}{c^2}}} \tag{4}$$

These frequencies are plotted as functions of the normalized radius r in Fig.1. The complete details of calculations using the symbolic Mathcad 15 software are provided in Appendix.

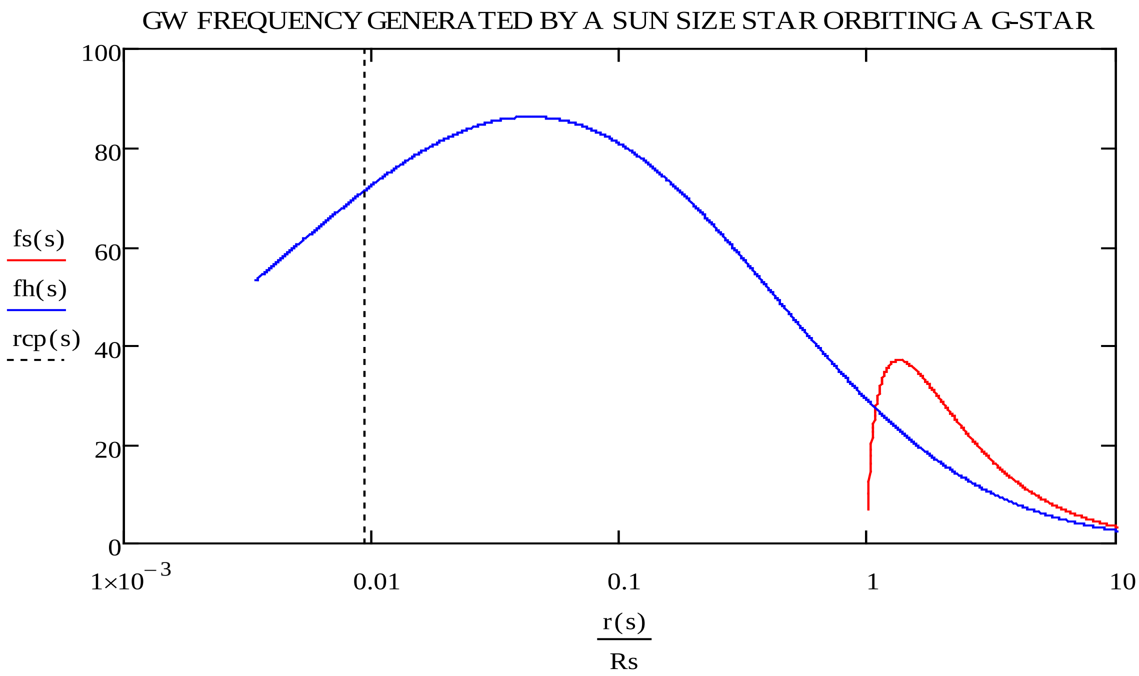
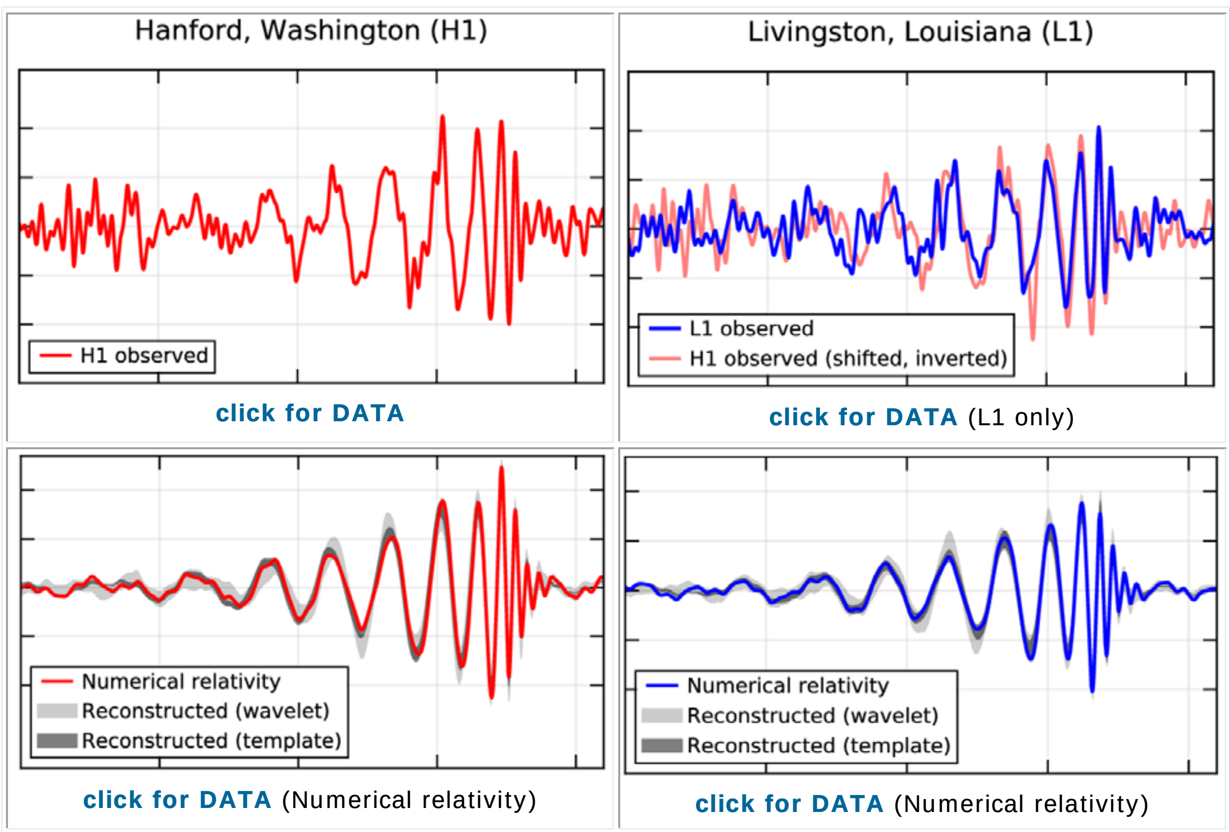


Fig.1. the GW frequencies generated by a Sun size star orbiting the G-star 100 times more massive than our Sun plotted as functions of the normalized radial distance r. The blue trace is for the new metric and the red trace is for the Schwarzschild metric. The dotted line is the surface location of the main G-star.

As can clearly be seen from the graphs, the frequency for the BH case exhibits first a chirp up as the radius is reduced and then a quick chirp down essentially all the way to zero as the orbiting body approaches the Schwarzschild radius, the Event Horizon at $r = R_s$. This is not the case for the G-star. The chirp up is much larger, because the G-star has much smaller radius. There is also a small chirp down of only a few percent forming essentially a plateau, but not all the way to zero when the orbiting body collides with the main G-star surface. These are the clear characteristics that should distinguish these two cases from each other and finally put to rest the controversy whether the BHs exist or not. The observational proof that the BHs do not exist will question the correctness of Einstein General Relativity Theory and eventually lead to its abandonment or at least to its significant modifications. This will also have a profound impact on the current theory of the Universe that is firmly based on the GR and on the Big Bang assumption. The GWs detection thus marks a significant milestone in our understanding of the Universe, its laws, and its behavior.

Comparison with observations: The presented frequency data were obtained from the LIGO Open Science Center [1]. From the frequency graphs shown in Fig.2 and the chirp graphs it is clear that there is no noticeable chirp down before the orbiting body collides with the main body. It is thus clear and an observational proof that there are no BHs involved. Perhaps after additional data are collected this will become undisputable fact without any doubts.



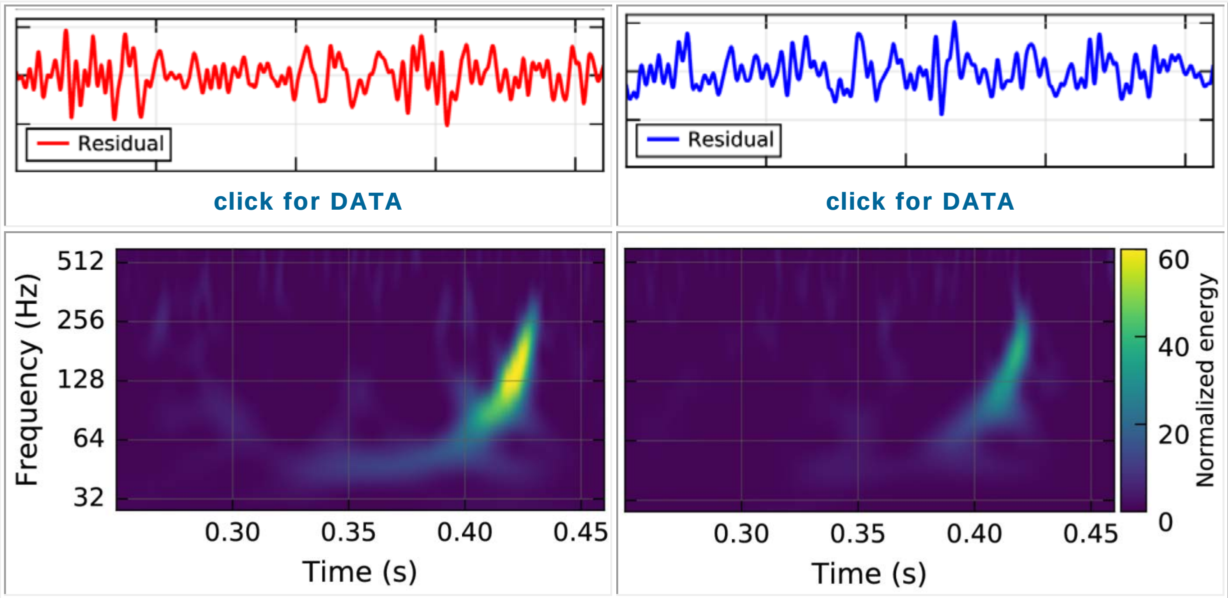


Fig.2. GW frequency scans from two LIGO detectors [1]. From the graphs it is abundantly clear that there is no frequency chirp down as the bodies approach their collision. Perhaps only a small region of a relatively stable frequency plateau that can be observed as is consistent with the graph for the new metric. This is clear evidence that there are no BHs only G-stars without EHs.

Conclusions: This short paper provided a simple analysis of the detected GW frequencies based on the relativistic Kepler's third law for circular orbits. Perhaps a more complex and more complete analysis is necessary that would include the two massive G-stars instead of a Sun size G-star orbiting a main large G-star. Nevertheless the results of the analysis conclusively determined that there are no BHs that caused the detected GWs during their collision and that the detected GWs are generated by colliding G-stars that do not have Event Horizons. The calculated frequencies are slightly lower than the detected frequencies, but this is due to the selected mass of the central G-star to be more consistent with the derivation assumption of the Kepler's third law. For the supermassive G-stars the GW frequencies would be significantly lower and therefore more difficult to detect.

The author hopes that as the GW detection capabilities improve and the detection becomes more accurate, the myth of BHs existence together with the GRT and the Big Bang theory will all crumble under the mounting evidence. More on the GRT criticism can be found elsewhere [4, 5, 6].

References: [1] https://losc.ligo.org/events/GW150914/

[2] https://physics.aps.org/featured-article-pdf/10.1103/PhysRevLett.116.061102

[3] http://vixra.org/abs/1506.0127

[4] http://gsjournal.net/Science-Journals-Papers/Author/201/Jaroslav,%20Hynecek

[5] http://physicsessays.org/browse-journal-2/product/397-17-jaroslav-hynecek-the-galileo-effect-and-the-general-relativity-theory.html

[6] http://vixra.org/author/jaroslav_hynecek

Appendix:

Gravitation Wave Frequency

Ms	mass of Sun
Ly	Light year length
Rs	Schwarzschild radius
κ	gravitation constant
c	speed of light
X	multiplier of solar mass
r(s)	natural radius (distance)
ρ(s)	physical radius (distance)
s	scaling parameter

$\kappa := 6.6742 \cdot 10^{-11} \frac{m^3}{kg \cdot s^2}$

$Ms := 1.989 \cdot 10^{30} kg$

$Lyo := 365.25 \cdot 24 \cdot 60 \cdot 60 \cdot c \cdot sec$

$Ly := 9460730472580.8 \cdot km$

$c = 2.997925 \times 10^{8} \frac{m}{s}$

$TOL := 10^{-8}$

$X := 100 \qquad Rs := \frac{2 \cdot \kappa \cdot Ms \cdot X}{c^2 \cdot m} \qquad Rs = 2.954082 \times 10^{5} \qquad r(s) := 10^{s}$

$s := 3, 3.002 .. 7 \qquad t := 3000$

$rc(r, Rs) := \int_0^r \exp\left(\frac{-Rs}{2 \cdot \xi}\right) d\xi \qquad \rho c(s, Rs) := root(rc(t, Rs) - r(s), t) \qquad \rho c(-10, Rs) = 3003$

$ra(s, Rs) := \int_0^{\rho c(s, Rs)} \exp\left(\frac{-Rs}{2 \cdot \xi}\right) d\xi \qquad rcp(s) := sign\left(\frac{Rs}{4} - \rho c(s, Rs)\right) \cdot 10^3$

$ts(s) := 2 \cdot \pi \cdot \sqrt{\frac{2 \cdot r(s)^3}{c^2 Rs}} \cdot \frac{1}{\sqrt{1 - \frac{Rs}{r(s)}}} \qquad th(s) := 2 \cdot \pi \cdot \sqrt{\frac{2 \cdot \rho c(s, Rs)^3}{c^2 \cdot Rs} + \frac{\rho c(s, Rs)^2}{c^2}} \, e^{\frac{Rs}{2 \cdot \rho c(s, Rs)}}$

$fs(s) := \frac{1}{ts(s)} \qquad fh(s) := \frac{1}{th(s)}$