Impedance of Spacetime - Continued

I was not expecting any answers which flatly rejected the idea that the impedance of spacetime is c^3/G. I assumed limited acceptance of this with qualifications anticipating my next step. However, since all three answers that I have received so far question $Z_s = c^3/G$, I will first defend this. As background, the largest of the "big physics" projects is the LHC. The second largest "big physics" project is probably the distributed effort to build equipment that will detect gravitational waves. The largest of these is LIGO in the US, but there are also about 4 other large interferometers built by other countries to detect gravitational waves. The point is that there are probably over 1,000 physicists involved in various aspects of gravitational wave detection. The most recent authoritative book titled: *Advanced Gravitational Wave Detectors*, was edited by Blair and several others. It was published by Cambridge University Press which always does peer review. In this book, the impedance of spacetime (c^3/G) is discussed in chapter 3. This chapter has the following authors:

D. G. Blair, L. Ju, C. Zhao, H. Miao, E. J. Howell, and P. Barriga

The point is that this is mainstream physics. For example, there is no doubt that the plane wave intensity if a gravitational wave is given by the following equation:

$$I = \left(\frac{\pi c^3}{4G}\right) A^2 \nu^2 \qquad (1)$$

This equation has an amplitude squared term, a frequency squared term and a term in brackets which is independent of amplitude and frequency. The common name for such a term is "impedance". This book identifies c^3/G as the "impedance of spacetime". Admittedly, this name implies that a gravitational wave is analogous to an acoustic wave or a light wave, both of which have "impedance". More specifically, a gravitational wave is thought of as analogous to a transverse sound wave that propagates in the medium of spacetime. Its amplitude term is a dimensionless sheer strain representing the maximum slope of a wave in spacetime. In Blare's book the amplitude term is casually described as "$h = \Delta L/L$" but I use the symbol "A" for amplitude since h has a quantum mechanical definition. This amplitude definition ($A = \Delta L/L$) presumes that the measurement distance "L" is much smaller than one wavelength. I need to use the more exact definition of maximum slope because I am dealing with arbitrary wavelength which might be very small. In this case $A = \Delta L/\lambda\!\!\!^{-}$ where $\lambda\!\!\!^{-}$ is lambda bar (1 radian wavelength). When amplitude is expressed as dimensionless strain amplitude, then impedance must have units of kg/s. The amplitude of sound waves are usually expressed as particle displacement with units of length. Then acoustic impedance has units of kg/sL^2. However, it is hypothetically possible to also express sound wave amplitude as dimensionless strain amplitude, in which case the impedance would have units of kg/s.

The one point of agreement between the answers that I have received so far is that EM waves have impedance of free space: $Z_o = 1/c\varepsilon_o \approx 377\ \Omega$. Therefore, another approach is to prove that Z_o converts to c^3/G when electrical units are demystified and converted to a distortion of space. As an introductory comment, I would like to say that today physicists treat an electric field or magnetic field as a mystery that will never be understood in terms of something more fundamental. We can write equations for these fields, quote energy density and forces, but we never ask the question: What is the underlying structure of an electric field? This is the reason that the group is satisfied with describing an electron as a modified photon. This concept appears to be basic if you assume that the

human mind is incapable of understanding electric and magnetic fields as a quantifiable distortion of something more basic. However, I have taken the position that everything (including electric fields) is derived from the single building block of 4 dimensional spacetime. Therefore, I took the bold step of looking for the constant of nature that would convert the electrical unit of coulomb into a quantifiable distortion of spacetime. In my opinion, this has been a spectacular success.

I am not going to defend the reasoning used to derive this constant. Instead, I defend the constant by submitting it to numerous tests. In every case it works out perfect. All electrical equations can be converted to distortions of spacetime and still give the correct answer for force, energy density, impedance, etc. Most important, this new constant leads to predictions which are both reasonable and give new insights into the electrical properties of nature. As I explain in my book, I was totally surprised when I discovered that the charge conversion constant converted the impedance of free space Z_o converts into the impedance of spacetime $Z_s = c^3/G$. This implies that EM radiation feels the same impedance as gravitational waves. Photons must be a quantized wave propagating in the medium of spacetime. I challenge the members of this group to disprove the validity of the proposed charge conversion constant by finding a single electrical equation which is incompatible with this constant.

The following attachment titled "Charge Conversion Constant" is a portion of the paper titled *Spacetime-based Foundation of Quantum Mechanics and General Relativity*. This shows the derivation and explains tests. A more complete explanation can be found in my book (pages 9-1 to 9-22). Both are available at my website: http://onlyspacetime.com/

Since everyone believes in Z_o, all I need to do is convince you that Z_o converts to $Z_s = c^3/G$.