[Letter to the Editors]

by Wolfgang Kundt,

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Dear Editor,

Today I approach you because of the science-fiction contribution on GW140915 by Angela Di Virgilio, in your issue 47/2 (2016) on pages 9-10, claiming that this GW event was launched by two stellar-mass black holes. It ignores a number of serious results during the past 7 years, by Pankaj Joshi, Bahram Mashhoon, Hernando Quevedo, Daniele Malafarina, and even Stephen Hawking (on 24 Jan. 2014), having proved that BHs are no longer expected, as results of gravitational collapse. It was derived by applying the chirp mass formula from John Wheeler's published lecture notes to the emission event, an analytical formula which has been derived for 2 point masses circulating around each other at large separations, and successfully applied to several binary neutron stars, but whose validity expires as soon as two stars approach each other close enough for tidal deformations, and for the emission of strong gravitational waves. The emitting masses then turn ill-defined. Instead, above gravitational signal has most likely been emitted by two coalescing neutron stars, at a(smaller) distance of <~ 30 Mpc, a fate which will some day likewise be shared by the Nobel (*cf.* https://wolfgangkundt.wordpress.com). ■

The author responds

Dear Prof. Kundt,

Some more exotic interpretations of the GW140915 event are possible, but the interpretation given by the LIGO/Virgo collaboration is probably the most economic and simple at the current stage of our knowledge. I'm more in the experimental side and my personal reaction in front of this event is that the antennas must be improved in the low-frequency part of the spectrum. I'm not the right person to fully address and reply your question; the GW community is rather large and this question need to be addressed to the right people. In any case, in order to give you a quick answer, I have discussed a bit with my colleagues and in the following I report some comments.

The claim that BHs have been proved not to exist is a bit misleading in this context. For example, the Hawking opinion you cited is mainly concerned with the real, absolute "blackness" of BHs, which is quite unrelated with the behaviour of these maybe "not completely black" objects when they collide. All these alternatives, naked singularities and so on, are surely interesting and worth to be experimentally tested.

Coming back to GW140915, trying to avoid too speculative physics, or as you said science fiction, for sure there is a clash between the observed signal (its frequency and its duration) and your suggested interpretation as a pair of neutron stars. For a NS-NS coalescence the signal is expected to remain in the LIGO sensitivity band much longer, mainly because a NS is much more compact that a 30 solar mass BH. This prediction is not based on the quadrupole approximation you are referring to, but on the analytical post Newtonian expansion and, in the final stage, on numerical simulation of full General Relativity. Quite remarkably, there is an overlap region where the two approaches agrees very well.

In any case, my personal hope is to have soon GW antennas on and with improved sensitivity, especially at low frequency, in order to help clarifying all this complicated matter. ■