COMMENT ON THE OFF-NUCLEAR ULTRASOFT X-RAY SOURCE J141711+52

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ABSTRACT

It has recently been reported that the candidate HLX ultrasoft x-ray source J141711+52 in SO galaxy GJ1417+52 is explained best by the presence of a massive black hole, of ~10^5 solar masses. Although the size of the black hole has been reported, the type of black hole has not. In any event, no black hole is associated with J141711+52 because the mathematical theory of black holes violates the rules of pure mathematics.

1. INTRODUCTION

Lin *et al* (2016) recently reported that the properties of J141711+52 are consistent with a black hole (BH) of ~10^5 solar masses "*embedded in the remnant nucleus of a satellite galaxy, with the outburst due to tidal disruption of a surrounding star by the BH.*" However, black holes are the product of a mathematical theory which violates the rules of pure mathematics. Consequently there is no possibility for a black hole to be associated with J141711+52.

2. MATHEMATICAL PROOF

The 'Schwarzschild solution', for $R_{\mu\nu} = 0$ is:

$$ds^2 = \left(1 - \frac{2m}{r}\right)dt^2 - \left(1 - \frac{2m}{r}\right)^{-1} dr^2 - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) \qquad (1)$$
$$0 \le r.$$

The quantity r in (1) can be replaced by any analytic function of r without violating spherical symmetry or $R_{\mu\nu} = 0$. However, not any analytic function of r is admissible because the solution must satisfy Einstein's prescription:

1. It must be static.
2. It must be spherically symmetric.
3. It must be asymptotically flat.

There exists an infinite equivalence class of solutions for $R_{\mu\nu} = 0$, thereby constituting all admissible 'transformations of coordinates'. If any element of this infinite equivalence class cannot be extended to produce a black hole then none can be extended, owing to equivalence. The infinite equivalence class is given by:

$$ds^2 = \left(1 - \frac{\alpha}{R_c}\right)dt^2 - \left(1 - \frac{\alpha}{R_c}\right)^{-1} dR_c^2 - R_c^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right)$$
$$R_c = \left(\left|r - r_0\right|^n + \alpha^n\right)^{1/n}, \quad r, r_0 \in \Re, \quad n \in \Re^+ \tag{2}$$

wherein r_0 and n are arbitrary constants, α a positive real-valued constant, and $r = \sqrt{(x - x_0)^2 + (y - y_0)^2 + (z - z_0)^2} + \sqrt{x_0^2 + y_0^2 + z_0^2} = r' + r_0$. It follows immediately that no element of (2) can be extended because $\left|r - r_0\right|^n \geq 0$. The line-element (1) cannot be extended to $0 \leq r$ to produce a black hole because it is an element of the class (2). Consequently, $0 \leq r$ in (1) is invalid because it implies a violation of the rules of pure mathematics. This is amplified by the case $r_0 = \sqrt{x_0^2 + y_0^2 + z_0^2} = 0$, $n = 2$. Schwarzschild's original form is recovered by selecting $r_0 = 0$, $n = 3$, $r_0 \leq r$.
According to cosmology there are four types of black hole. All related solutions must be elements of an infinite equivalence class that reduces to (2). The overall infinite equivalence class is given by:

$$ds^2 = \frac{a^2\sin^2\theta - \Delta}{\rho^2}dt^2 - \frac{2a^2\sin^2\theta\left(R_c^2 + a^2 - \Delta\right)}{\rho^2}dt\, d\varphi +$$
$$+ \frac{\left(R_c^2 + a^2\right)^2 - a^2\Delta\sin^2\theta}{\rho^2}\sin^2\theta\, d\varphi^2 + \frac{\rho^2}{\Delta}dR_c^2 + \rho^2 d\theta^2,$$
$$\Delta = R_c^2 - \alpha R_c + a^2 + q^2, \quad \rho^2 = R_c^2 + a^2\cos^2\theta, \quad R_c = \left(\left|r - r_0\right|^n + \xi^n\right)^{1/n}, \tag{3}$$
$$\xi = \frac{\alpha + \sqrt{\alpha^2 - 4q^2 - 4a^2\cos^2\theta}}{2}, \quad a^2 + q^2 < \frac{\alpha^2}{4}, \quad r, r_0 \in \Re, \quad n \in \Re^+,$$
$$r = \sqrt{(x - x_0)^2 + (y - y_0)^2 + (z - z_0)^2} + \sqrt{x_0^2 + y_0^2 + z_0^2} = r' + r_0.$$

No element of the infinite equivalence class (3) can be extended to produce a black hole without violating the rules of pure mathematics; again amplified by the case $r_0 = 0$, $n = 2$.

REFERENCES

Lin, D., Carrasco, E.R., Webb, N.A., et al. 2016, ApJ. 821, 1

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