

## The Internal Structure of the Intermediate-Mass Black Hole in the Centre of the Globular Cluster 47 Tucanae

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**Abstract:** B. Kiziltan et al. (9 February 2017) showed that pulsars in 47 Tuc imply a central black hole (BH) with a mass of about 2,200 solar masses (the upper limit is 3,700 solar masses whereas the lower limit is 1,400). Predictive power correlates with number of observed pulsars. The inference flattens with decreasing number of randomly selected pulsars. Here, applying the Scale-Symmetric Theory (SST), we suggest that the BH consists of 16 neutron black holes (NBH) entangled with 16 pulsars. With time, the set of 16 pulsars changes its constituents. SST shows that then mass of the central BH should be 2,536 solar masses. To such mass lead as well the observational data for 16 randomly selected pulsars. More precise observational data should show whether predicted within SST the exact mass of the central BH is correct.

The Scale-Symmetric Theory (SST) shows that the very strong short-distance quantum entanglement between the carriers of gluons in nucleons protects their cores from a collapse to a singularity [1]. It leads to conclusion that the black holes (BHs) consist of the neutron black holes (NBHs) and each NBH has mass  $f = 24.81$  times greater than the Sun i.e.  $M_{NBH} = f M_{Sun}$  [2].

Due to the four-object symmetry, NBHs are grouped in larger structures [2]. Number of entangled objects in a system is quantized [2]

$$D_{n,S} = 4^d \text{ (for single objects),} \quad (1a)$$

$$D_{n,B} = 2 \cdot 4^d \text{ (for binary systems),} \quad (1b)$$

where for flat/disc-like structures is  $d = 0, 1, 2, 4, 8, 16 \dots = 0, 2^n$ , where  $n = 0, 1, 2, 3, 4, 5, \dots$  whereas for chains is  $d = 3, 6, 12$  [2].

The NBHs in a BH are the single objects so, for example, a quadrupole of quadrupoles consists of 16 NBHs. According to SST, mass of dark matter associated with baryonic matter should be  $F = 5.389$  times higher [2]. Total mass of such a BH should be

$$M_{BH} = 16 (1 + F) f M_{Sun} = 2,536 M_{Sun} . \quad (2)$$

Such BH composed of 16 NBHs can be entangled with 16 pulsars. With time, the set of 16 pulsars changes its constituents. We can see that we should obtain correct mass of the central BH in 47 Tuc for 16 randomly chosen pulsars. The observational data show that then the mass of central BH [3] is close to the SST mass. Such result leads to conclusion that the central BH has rich internal structure which contains 16 seeds. We should revise the mainstream theory of black holes.

More precise observational data should show whether predicted within SST the exact mass of the central BH is correct.

### References

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- [3] B. Kiziltan, *et al.* (9 February 2017). "An intermediate-mass black hole in the centre of the globular cluster 47 Tucanae"  
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