Detection of a compact dwarf galaxy at birth ?

We have measured the dynamical mass of the highly luminous star cluster W3 in the young merger remnant galaxy NGC 7252. The value of $8.2\times10^7 M_\odot$ represents the highest mass being measured for an extra-galactic star cluster so far. We classify W3 with the *fundamental plane* of stellar systems. We find that W3 lies far from the most massive globular clusters and from dwarf ellipticals. Instead its structural properties are similar to compact dwarf galaxies (e.g. M32), possibly sheding light on the still mysterious nature of these objects. A previously deserted region of the fundamental plane starts to be populated.

Extreme star bursts involved in galaxy mergers produce star clusters with masses up to $10^7 M_\odot$, that are suggested to evolve into globular clusters (GCs). However some objects seem to escape such prejudices, because their luminosity-estimated masses are much larger than those of the most massive GCs $\left(\approx 10^6 M_\odot\right)$. **The most extreme case is W3 a star cluster in the young merger remnant NGC 7252** for which the luminous mass was estimated to be $\approx 10^8 M_\odot$ (Maraston et al. 2001, **Fig. 1** for a K-band image). In order to check this value dynamically, we acquired a high-resolution spectrum with UVES mounted on the Very Large Telescope (Maraston et al. 2004, **Fig. 2**), on which we have measured the velocity dispersion and derived the stellar mass.

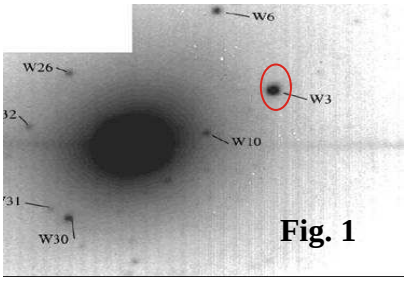

Fig. 1

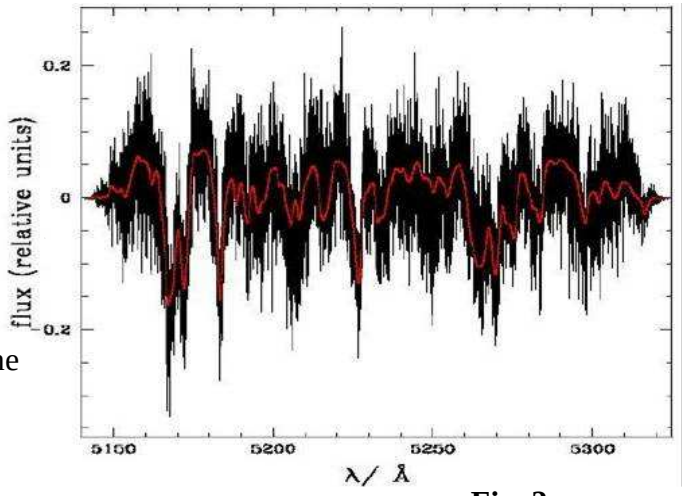

Fig. 2

Our result is the astonishingly high velocity dispersion of 45 km/s that, combined with the large cluster size (17.5 pc), translates into a dynamical virial mass of $8\times10^7 M_\odot$, in perfect agreement with the luminous mass.

In order to understand the nature of W3, we use the *fundamental plane* (Bender et al.1992), that connects the basic physical properties of stellar systems: the mass, the radius and the compactness (**Fig. 3**). B, E stand for bulges and ellipticals, dE for dwarf ellipticals, GC for globular clusters (G1 and wCen being the most massive GCs of the Local Group). W3 is shown as a red star, with the arrow indicating its position when aged to 10 Gyr. **W3 is too extended for its mass to be a GC, but is also too compact to be a dE. It seems more connected to the class of compact dwarf galaxies (UCDG, M32)** .

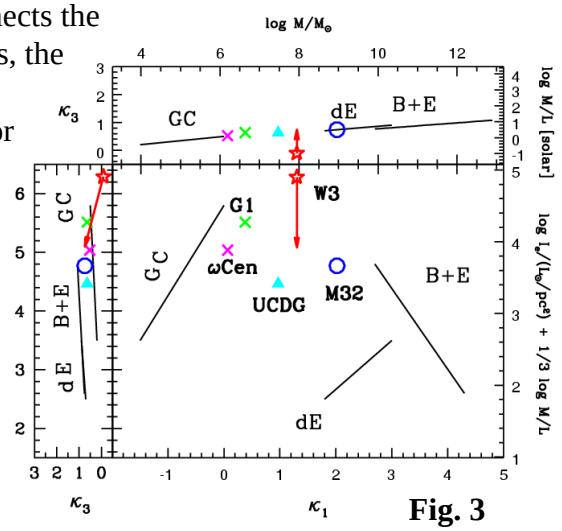

Fig. 3

References:

•Bender, R. et al. 1992, ApJ, 399, 462

• Maraston, C. et al. 2001, A&A, 300, 176

• Maraston, C. et al. 2004, A&A, 416, 467

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