

Mrk 1087: a puzzling suspected Wolf-Rayet galaxy

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Abstract. We present new observations of Mrk 1087 that indicate this galaxy is experiencing a strong star formation event due to the interaction with -at least- two nearby galaxies, one of them is a star-forming dwarf. We also discover that some of the surrounding non-stellar objects are tidal dwarfs hosting weak starbursts.

1. Observations

Mrk 1087 ($d = 111$ Mpc) is a suspected Wolf-Rayet galaxy (Schaerer *et al.* 1999). It has a companion galaxy (K72 103a) at 81 kpc to the southwest and at the same distance. Keel (1988) proposes that the object is a galaxy in formation surrounded by filaments of infalling ionized gas. We have obtained long-slit intermediate-resolution spectroscopy covering most of the objects surrounding the galaxy, as reported by Méndez & Esteban (2000), and a deep V -band CCD image of the whole group (Figure 1). Our new image shows a new faint companion galaxy ($M_V \simeq -18.2$) just to the north of Mrk 1087 (labeled as companion in Figure 1). It has an elliptical shape and shows nebular emission. It shows a radial velocity of $+117 \text{ km s}^{-1}$ with respect to the main body of Mrk 1087. Therefore, both galaxies may be physically associated and at a relative distance of about 60 kpc.

2. Results

We have detected faint nebular emission in objects #1, #3, and #7, but not in #12. Objects #2 and #11 were not observed. Objects #1 and #3 show radial velocities close to the systemic velocity of Mrk 1087. Keel (1988) interpreted #7 as a companion external object, interacting with the main galaxy. However, we do not confirm his result; in fact #7 seems to follow closely the general rotation pattern of the ionized gas of the main galaxy. We do not detect the [O III] 4363 Å line in any of the spectra and, therefore, we have estimated the abundances from the so-called empirical calibrations, making use of the R_{23} parameter and/or the [N II]/ $H\alpha$ ratio. The absolute magnitudes indicate, that all the objects except the main body of Mrk 1087 can be considered as dwarf galaxies. The O/H ratios estimated for objects #1 and #3 are similar to that of

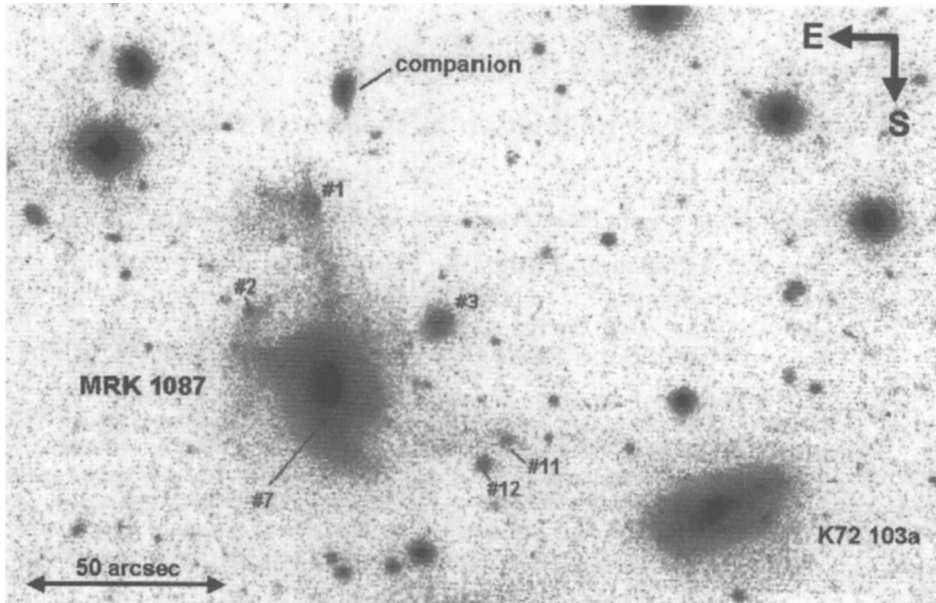


Figure 1. Deep V-band CCD image of Mrk 1087 and its surroundings.

the main galaxy ($12+\log(\text{O}/\text{H})=8.7$) and larger than the abundance expected for the metallicity-luminosity relation for classical dwarfs. This result indicates, that objects #1 and #3 can be considered as tidal dwarfs originating from material stripped from Mrk 1087. Object #7 shows O/H and N^+/O^+ ratios lower but not so different to that of the main galaxy. The O/H abundance is larger than that expected for a dwarf galaxy and therefore we interpret #7 as an intense star-forming zone off-center of Mrk 1087. The O/H ratio obtained for the companion object ($12+\log(\text{O}/\text{H})=8.3$) is lower than that of the main galaxy and consistent with the metallicity-luminosity relation for dwarfs. Moreover, the N^+/O^+ is also lower than that of Mrk 1087 and of the order of the typical value for dwarf galaxies (-1.55 , for the main galaxy is -0.99). Therefore, the north companion should be interpreted as an independent nearby dwarf galaxy, that is probably interacting with Mrk 1087. This could explain the presence — at least — of the tidal dwarf #1 and its associated bridge, which is almost aligned with the companion galaxy (see Figure 1).

In conclusion, we consider that Mrk 1087 and its surroundings can be considered as a compact group of galaxies. This result is a further indication of the importance of the interactions with difficult-to-detect dwarf galaxies in the triggering of strong starbursts, and specially in Wolf-Rayet galaxies.

References

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 Schaerer, D., Contini, T., Pindao, M. 1999, *A&AS* 335, 85