A CASE STUDY FOR A TIDAL INTERACTION BETWEEN DWARF GALAXIES IN UGC 6741

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ABSTRACT

We present a case study of the tidal interaction between low-mass star-forming galaxies initially found in the Sloan Digital Sky Survey (SDSS) images and further analyzed with SDSS spectroscopy and UV GALEX photometry. With a luminosity of $M_r = -17.7$ mag and exhibiting a prominent tidal filament, UGC 6741 appears as a scaled down version of massive gas-rich interacting systems and mergers. The stellar disk of the smaller companion, UGC 6741 B, which is three times less massive, has likely already been destroyed. Both galaxies, which are connected by a 15 kpc long stellar bridge, have similar oxygen abundances of $12 + \log(O/H) \sim 8.3$. Several knots of star-forming regions are identified along the bridge, some with masses exceeding $\sim 10^4 M_\odot$. The most compact of them, which are unresolved, may evolve into globular clusters or ultra compact dwarf galaxies. This would be the first time progenitors of such objects are detected in mergers involving dwarf galaxies. UGC 6741 currently has the color and star formation properties of blue compact dwarf galaxies (BCDs). However, analysis of its surface photometry suggests that the galaxy lies within the scaling relations defined by early-type dwarf galaxies (dEs). Thus, UGC 6741 appears as a promising system for studying the possible transformation of BCDs into dEs, possibly through a merger episode. The frequency of such dwarf–dwarf mergers should now be explored.

Key words: galaxies: dwarf – galaxies: evolution – galaxies: interactions – galaxies: peculiar – galaxies: star formation – galaxies: stellar content

1. INTRODUCTION

Since Halton Arp published an atlas of peculiar galaxies and Toomre & Toomre (1972) reproduced their shape with numerical simulations of tidal encounters, mergers have become key processes in the understanding of galaxy evolution. Simulations show how colliding disk galaxies are reshaped into pressure-supported early-type bodies after the final merger. In a ΛCDM cosmology (Spergel 2007), which assumes that the assembly of large-scale structure happens in a hierarchical fashion, mergers play a fundamental role in the growth and evolution of galaxies (Conselice et al. 2009).

During the intermediate phases of interactions, large-scale tidal interactions trigger the formation of peculiar features like shells, streams, bridges, and tails. The presence of such structures, which is predicted by numerical simulations, is now frequently observed in deep imaging surveys (Struck 1999; van Dokkum 2005; Duc et al. 2011, 2015; Kim et al. 2012).

Numerous works have detailed the various phenomena occurring during galaxy interactions, including the formation in the collisional debris of substructures, like tidal dwarf galaxies (TDGs; Duc et al. 2007). However, the vast majority of such studies focused on massive galaxies. Not much is known on tidal forces generated by the encounter between low-mass galaxies.

It is common belief that, having a shallow potential well, low-mass galaxies have an evolution that is more driven by the large-scale environment than by merging events. Dwarf galaxies exhibit strong morphological segregation: the most evolved / oldest dwarf galaxies, i.e., dwarf Spheroidal or dwarf early-type (dE), are found in the group and cluster environments (Kormendy et al. 2009; Lisker 2009), while dwarfs with ongoing star formation activity, such as blue compact dwarf galaxies (BCDs; Papaderos et al. 1996; Gil de Paz et al. 2003), are mainly found in less dense environments. However, how precisely the environment contributes to the transformation of star-forming dwarfs to anemic dEs is still a puzzle, as several processes may play a role (Boselli & Gavazzi 2006). Besides, the mechanism that triggers the burst of star formation in dwarf galaxies, particularly in BCDs, also remains a mystery. Mergers, fly-by encounters, or gas turbulence have been proposed (Noeske et al. 2001; Pustilnik et al. 2001; Bekki 2008).

Very recently, observational evidence for mergers between dwarf galaxies has been growing (e.g., Geha et al. 2005; Graham et al. 2012; Martínez-Delgado et al. 2012; Penny et al. 2012; Rich et al. 2012; Johnson 2013; Nidever et al. 2013; Amorisco et al. 2014; Crnojević et al. 2014; Toloba et al. 2014). The possibility has been proposed that dEs might be formed through mergers like the massive ellipticals. If this is the case, one would expect the progenitors of dEs to exhibit characteristics features of mergers, such as tidal tails.

The system presented here, UGC 6741, was initially found during a systematic eye inspection of tidal debris in the Sloan Digital Sky Survey (SDSS) images. It was classified as a low surface brightness galaxy pair in Schombert & Bothun (1988). We report a multi-wavelength study of the system based on archival optical images and spectra from the SDSS DR7 release and UV images from the GALEX all-sky survey (Martin et al. 2005; Abazajian et al. 2009).

2. DATA AND ANALYSIS

2.1. Target Selection and Location

In an our effort to search for tidal features around low-mass nearby galaxies, we visually inspected true color ($g + r + i$) SDSS images of nearly 40,000 galaxies located at redshifts below 0.02. The most prominent tidal feature was found in the galaxy pair UGC 6741. With a luminosity $M_r = -17.7$ mag,
UGC 6741 is slightly fainter than the two well-known local group dwarf galaxies, the Large Magellanic Cloud and NGC 4449. Its interacting companion, hereafter UGC 6741-B, has a luminosity of $M_r = -16.2$ mag\(^4\); see Table 1.

By chance, UGC 6741 benefits from substantial multi-wavelength data in public archives, which allowed us to perform a thorough analysis of its morphology, chemical properties, and stellar populations.

As shown in Figures 1 and 3, a 15 kpc long stellar bridge connects the two galaxies along the north–south direction. It hosts a number of compact blue clumps—the most prominent ones are named objects A, C, D, E, and F. Object F is located to the north of UGC 6741, and either belongs to a secondary tail or to the bridge if the latter wraps around in proximity to the galaxy. Overall, the system resembles classic mergers of massive gas-rich disk galaxies.

UGC 6741 is located on the outskirts of a group with an angular distance of 0°.73 from the central galaxy, NGC 3853. In Figure 2, we show the group member galaxies located around a radius of 700 kpc centered on NGC 3853 and with relative radial velocities within ±500 km s\(^{-1}\). We used the NED database to carry out this search. The difference in radial velocity between NGC 3853 and UGC 6741 is less than 100 km s\(^{-1}\).

2.2. Imaging and Photometry

To perform a detailed image analysis, we retrieved archival images from the SDSS DR7 database (Abazajian et al. 2009). We used the $r$-band image as a reference, since it provides a higher signal-to-noise ratio on the tidal debris than the other bands. The seeing in this field is 0″.9 (as measured from the $r$-band PSF). In order to enhance the detectability of the bridge and the faint objects within it, a $g+i$ co-added image was made (see Figure 3, left), and a galaxy model subtraction was carried out (see Figure 3, middle). On such images, object B appears to be much more luminous, extended, and redder (see Figure 3, right) than the clumps A, C, D, E, and F located along the tidal feature. As previously mentioned, B is most likely the main body of the disrupted companion of UGC 6741. The bluest clump, object E, is located at the upper tip of the bridge and embedded within the stellar halo of UGC 6741. Object A is somewhat irregular and contains several compact sub-clumps.

The extended Clump A, located at the tip of the tidal feature, is the brightest star-forming region. The fairly compact regions C, D, and E are actually likely wrongly classified as stars in the

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Footnotes:

\(3\) Incidentally, the two latter galaxies are also involved in a tidal interaction.

\(4\) Throughout the paper, we assumed a distance to the galaxy of $D = 54.2$ Mpc, which is the distance of the main galaxy group member, NGC 3853, provided by NED.
of the oxygen abundance, \(12 + \log \frac{O}{H}\) for UGC 6741 is 8.3 ± 1.2. The star-forming clumps are named in alphabetical order starting from the bottom. Note that object B is likely the main body of the low-mass companion of UGC 6741 and is referred as UGC 6741 B in the main text. Right: \(g - r\) color map, with the scale in magnitudes indicated to the right. The field of view of each image is 90° × 120°.

**Figure 3.** Interacting system UGC 6741 as seen in the optical with the SDSS. Left: co-added \(g + r + i\) image with an arcsinh scaling. The black contours represent the detection limit of 3σ corresponding to a surface brightness level of \(\sim 25.5\) mag arcsec\(^{-2}\) in the r band. Middle: residual image after having subtracted a model galaxy of UGC 6741. Prominent star-forming clumps are named in alphabetical order starting from the bottom. Note that object B is likely the main body of the low-mass companion of UGC 6741 and is referred as UGC 6741 B in the main text. Right: \(g - r\) color map, with the scale in magnitudes indicated to the right. The field of view of each image is 90° × 120°.

- **Table 1** Global Properties of the System

| Galaxy  | R.A.     | Decl. | Mr  | \(v_r\)  | \(M_*\) | SFR\((m_{\text{FUV}})\) | 12 + \log(\frac{O}{H}) | \(R_e\) | \(\langle \mu \rangle_r\) |
|---------|----------|-------|-----|----------|-------|-------------------|-----------------|-------|-----------------|
| UGC 6741 | 176.4793 | 17.1923 | -17.74 ± 0.01 | 3390 | \(6.0 \times 10^8\) | 0.09 (17.96 ± 0.08) | 8.3 | 1.2 | 21.71 |
| UGC 6741 B | 176.4827 | 17.1732 | -16.16 ± 0.01 | 3300 | \(1.9 \times 10^8\) | 0.03 (19.01 ± 0.12) | 8.3 | … | … |

**Notes.** The SFR is estimated from the FUV magnitude given in parentheses. A galactic extinction correction has been applied using the formula \(A_{BC} = 8 \times E(B - V)\) with \(E(B - V) = 0.2\). The stellar mass is derived from the \(r\)-band magnitude and the mass-to-light ratio obtained from Bell et al. (2003) for the color \(g - r\). The value of the oxygen abundance, \(12 + \log(\frac{O}{H})\), is derived with the OSN2 method which has a typical systematic error of 0.2 dex.

\(\langle \mu \rangle_r\) The FUV flux and derived SFR includes star-forming region A; see Figure 3.

SDSS catalog. Our measured FWHMs for these knots are well consistent with the median FWHM of foreground stars, i.e., 0.05′, and in the absence of available radial velocities, we cannot totally exclude chance superposition of foreground blue stars or background compact objects. However, the remarkable alignment of these objects along the stream and their similarity in color (see Figures 1 and 3) are strong hints of a real physical association with the system.

The interacting dwarf galaxies and associated tidal debris are clearly detected in the NUV, and barely detected in the FUV by the GALEX all-sky survey (see Figure 4). Since the GALEX images have a spatial resolution of only 5′, the star-forming regions are not resolved individually in the UV images. The star formation rates (SFRs), derived from the FUV fluxes applying a Galactic extinction correction from Schlegel et al. (1998) and using the calibration of Kennicutt (1998), are given in Table 1.

With the help of the IRAF ellipse task, we performed a surface photometry analysis of UGC 6741. First, we extracted the galaxy major-axis light profile from the \(r\)-band image. In doing so, the center and position angle of the ellipse were held fixed and the ellipticity was allowed to vary. The center of the galaxy was calculated using the task imcenr and input ellipse parameters were determined using the several iterative runs of the ellipse task. The derived \(r\)-band major-axis light profile of UGC 6741 is shown in Figure 5. With the help of the \(\chi^2\)-minimization scheme, we obtained a best fit model where the observed profile is decomposed into the two component Sérsic functions. The inner and outer components are best fitted with the Sérsic functions of \(n = 0.61\) and 3, respectively.

Since the observed light profile of UGC 6741 is better represented by a multi component Sérsic function, the derivation of the effective radius and effective surface brightness is not obvious. Therefore, we estimated these parameters with a non-parametric approach. Using a similar procedure followed by Janz & Lisker (2008), we first calculated the Petrosian radius and the total flux was measured within two Petrosian radii. Note that, contrary to Janz & Lisker (2008), we do not correct for the the missing flux estimated by Graham & Driver (2005). Indeed this correction is very small for dwarf galaxies (Chen et al. 2010). The derived values of the structural parameters of UGC 6741 are given in Table 1. We find that the mean surface brightness within the half-light radius is 21.7 mag arcsec\(^{-2}\) in the SDSS \(r\)-band. This is in fact a rather low surface brightness value of a low surface brightness galaxy, as described in Schombert & Bothun (1988).

We performed aperture photometry on the entire system. For this, we first manually masked all non-related objects and selected a large aperture that includes the entire system. The total \(r\)-band luminosity is \(m_r = 15.53 ± 0.01\) and the \(g - r\) color index is 0.1 ± 0.01 mag. The FUV and NUV luminosities are 17.21 ± 0.07 and 17.06 ± 0.03 mag, respectively. Using the
same conversion factors as for the individual substructures, we derived a total stellar mass $M_{*,\text{total}} = 8.3 \times 10^8 M_\odot$ and a total star formation rate $\text{SFR}_{\text{total}} = 0.18 M_\odot \text{yr}^{-1}$.

2.3. Gas Content

Atomic hydrogen ($\text{H} \, \text{i}$) 21 cm radio data are available in the Hyperlyda archive (Paturel et al. 2003). Observations of UGC 6741 were made with the Arecibo single-dish telescope. The large beam size, $\sim3'$ (Lu et al. 1993), covered the entire interacting system. The cataloged archival HI parameters are listed in Table 3. We computed a total HI mass of $8.7 \times 10^8 M_\odot$, and an inferred HI mass to blue luminosity ratio, $M_{\text{HI}}/L_B$, of $0.65 M_\odot/L_\odot$. This number is similar to the average value of $M_{\text{HI}}/L_B$ for the sample of BCDs studied in Huchtmeier et al. (2005) but significantly lower than in typical isolated low surface brightness dwarf galaxies (Pustilnik & Teplia-kova 2011). We estimated the expected HI mass of UGC 6741 using an empirical relation between the HI mass and the diameter (Gavazzi et al. 2005), $M_{\text{HI}}/L_B = a + b \log (d)$. For this, we used the isophotal diameter provided by NED and adopted the constants $a = 7.00$ and $b = 1.88$ for Scd-Im-BCD type galaxies. The expected HI mass is less than half of the observed HI mass in the whole system.

The HI spectrum shows a single velocity peak (see Figure 1 in Lu et al. 1993) that may suggest the absence of a kinematically distinct HI component for each galaxy. Note, however, that the observed velocity width is similar to the difference in radial velocity measured from the optical spectra of each galaxy, i.e., 76 km$^{-1}$.

2.4. Optical Spectroscopy

The optical spectra of both UGC 6741 and UGC 6741_B were queried from the SDSS archives (see Figure 6). They exhibit the emission lines typical of H$\beta$ regions as well as relatively strong absorption for the early Balmer lines H$\delta$, $\gamma$ and $\beta$. The emission line fluxes were measured after

![Image](Figure 4. GALEX all-sky survey NUV (left) and FUV (right) images of UGC 6741.)

![Image](Figure 5. Major axis radial profile of UGC 6741, where the observed profile is fitted with two component Sersic model.)

### Table 2

| R.A. $\alpha$ | Decl. $\delta$ | $g$ (mag) | $r$ (mag) | $i$ (mag) | $M_*$ ($10^8 M_\odot$) |
|--------------|---------------|-----------|-----------|-----------|------------------------|
| A 176.4821   | 17.1704       | 18.46 ± 0.02 | 18.52 ± 0.03 | 18.39 ± 0.04 | 0.35                   |
| B 176.4827   | 17.1732       | 17.76 ± 0.02 | 17.51 ± 0.02 | 17.37 ± 0.02 | 1.94                   |
| C 176.4820   | 17.1810       | 19.42 ± 0.03 | 19.55 ± 0.04 | 19.33 ± 0.05 | 0.11                   |
| D 176.4817   | 17.1827       | 20.51 ± 0.05 | 20.73 ± 0.08 | 20.44 ± 0.10 | 0.03                   |
| E 176.4808   | 17.1875       | 20.83 ± 0.06 | 21.07 ± 0.10 | 20.59 ± 0.10 | 0.02                   |
| F 176.4775   | 17.1940       | 18.05 ± 0.01 | 18.08 ± 0.02 | 18.23 ± 0.03 | 0.57                   |
| U 176.4793   | 17.1923       | 16.05 ± 0.02 | 15.93 ± 0.02 | 15.77 ± 0.03 | 6.02                   |

**Notes.** The galactic extinction is corrected with Schlafly & Finkbeiner (2011). Stellar masses are converted from the $r$-band magnitude using the mass-to-light ratio from Bell et al. (2003), i.e., $\log(M/L) = -0.306 + 1.097(g - r)$.

### Table 3

| $\mu$, mag/arcsec$^2$ | $\mu_\text{r}$, mag/arcsec$^2$ | $\mu_\text{i}$, mag/arcsec$^2$ |
|------------------------|-------------------------------|-------------------------------|
| 20.89 ± 0.10          | 20.97 ± 0.10                  | 20.94 ± 0.10                  |

**Figure 4.** GALEX all-sky survey NUV (left) and FUV (right) images of UGC 6741.
subtracting the stellar absorption features using the publicly available code GANDLF (Sarzi et al. 2006) and the stellar templates of Tremonti et al. (2004).

The extinction coefficient, $E(B-V)$, derived from the Balmer decrement Hα/Hβ is nearly equal to zero for UGC 6741 and even below the standard value of 2.86 for UGC 6741_B. This may indicate a poor subtraction of the absorption at Hβ due to the low signal-to-noise ratio.

The Hα equivalent widths—7.1 and 8.7 Å for UGC 6741 and UGC 6741_B, respectively—are relatively small compared to the typical BCD Hα equivalent widths (Gil de Paz et al. 2003).

Oxygen abundances, $12 + \log(O/H)$, were estimated with the two methods described, among others, by Marino (2013), i.e., the so-called N2 and O3N2 methods. The N2 method only considers the line ratio between Hα and [NII] while the O3N2 method uses a combination of the line ratios Hα/[NII] and [Oiii]/Hβ. We obtained $12 + \log(O/H) = 8.3(8.3)$ and 8.3(8.2) dex from the N2(O3N2) method for UGC 6741 and UGC 6741_B, respectively. These values are in the range of typical BCDs (Gil de Paz et al. 2003; Vaduvescu et al. 2007). The systematic error of the methods is 0.2 dex.

3. DISCUSSION AND CONCLUSION

We have presented the case of a dwarf–dwarf merger in a group environment. Remarkably, our multi-wavelength study, based on imaging and spectroscopy, could be carried out with data solely acquired from publicly available archives.

We discuss below the origin of its prominent star-forming tidal bridge and speculate on the future evolution of UGC 6741.

3.1. Nature of the Tidal Features and its Star-Forming Regions

UGC 6741 is noteworthy for the presence of a tidal bridge hosting knots of star formation, and in that respect resembles systems involving massive colliding galaxies, such as Arp 104 (Gallagher & Parker 2010) or Arp 188 (UGC 10214), also known as the Tadpole galaxy. A comparison between these systems is made in Figure 7.

Like UGC 6741, Arp 104 exhibits a prominent tidal bridge, with hints that part of the tidal material wraps around one of the interacting galaxies (NGC 5218, to the north). For this system however, there is no evidence for the presence of star-forming regions along the bridge.

As in UGC 6741, the long single tail that emanes from Arp 188 hosts multiple compact knots of star formation. Some of its young massive star cluster are as massive as $\sim 10^6 M_\odot$ (de Grijs et al. 2003; Tran et al. 2003; Jarrett 2006) and were most likely formed in situ in the tail out of gaseous material expelled from UGC 10214 during a dynamical interaction with a hidden or already destroyed companion.

Given its shape, the stellar filament of the system studied here is undoubtedly of tidal origin. Is it, however, as for Arp 104 a bridge connecting two interacting galaxies, namely UGC 6741 and UGC 6741_B, or a single tail like in Arp 188, with UGC 6741_B being a TDG instead of a pre-existing object?

Interestingly, the gas phase metallicity derived from the SDSS archival spectra reveals within the errors no difference in oxygen abundance between UGC 6741 and UGC 6741_B, although the latter is three times less massive. The mass–metallicity relation would predict an abundance of about 0.2 dex lower.

Similar metallicities between the parent galaxy and its tidal dwarf are instead expected as the latter is made from material pre-enriched in the former (Duc et al. 2007, 2015). This may in principle argue in favor of the TDG hypothesis for UGC 6741_B. This is, however, without taking into account the rather large intrinsic scatter of the $M-Z$ relation of 0.2 dex and of the systematic uncertainty in the abundance determination of the same order.

The existence of a prominent stellar continuum (see Figure 6) suggests that the object has a significant fraction of old stellar populations, and the presence of strong Balmer absorption lines is a signature of star formation over an extended period of time. The TDGs so far discovered are rather characterized by the overall dominance of young stars and of an ongoing instantaneous starburst. This suggests that UGC 6741_B is a pre-existing dwarf that is interacting with UGC 6741. Therefore, the system would in fact be rather a scaled down version of Arp 104 with an overall luminosity $\sim 0.4$ mag fainter.

Evidence of in situ star formation occurring in gas-rich collisional debris has been reported in numerous massive interacting galaxies, including the Tadpole galaxy discussed above. Such regions are also believed to be a nursery of super star clusters (e.g., de Grijs & Parmentier 2007; de Mello et al. 2008; Peterson et al. 2009; Fedotov et al. 2011). Idealized numerical simulations of mergers reproduce the formation of massive and compact super star clusters in tidal tails (Bournaud et al. 2008; Renaud et al. 2015) and predict that they might be the progenitors of globular clusters, provided they survive

Figure 6. SDSS optical spectra of UGC 6741 and its companion UGC 6741_B. The observed spectra are shifted to rest frame wavelength and smoothed with a three pixel Gaussian kernel.
internal feedback and external tidal shear. The most massive and extended of them may become independent TDGs. The same phenomena seem to also occur in dwarf–dwarf major mergers. The bridge of UGC 6741 hosts at least four distinct knots of star formation. They are as massive as \(\sim 10^7 \, M_\odot\); with a stellar mass density reaching \(\sim 10^8 \, M_\odot \, \text{kpc}^{-1}\), they could evolve into globular clusters or even ultra compact dwarf galaxies (UCDs). As their parent galaxies are low-mass systems with shallow potential wells, one may speculate that they will survive longer than in an environment of systems involving massive merging galaxies.

### 3.2. Dwarf–Dwarf Merger

De Lucia et al. (2006) show that the statistical probability of a merger of galaxies decreases toward the low-mass regime. Our study of UGC 6741, however, proves that dwarf–dwarf tidal interactions and mergers occur in the nearby universe. How frequent are they? On one hand, exploring the Millennium Cosmological Simulation, Moreno et al. (2013) found that binary mergers in isolation are very rare, and claimed that satellite–satellite mergers should play a larger role than so far anticipated. On the other hand, Klimentowski et al. (2010) used the constrained local universe simulation to conclude that interactions between satellites are unlikely. In a group environment, mergers between sub-halos are predicted to occur only before they entered the host halo. Interestingly, UGC 6741 is itself located in the very outskirts of a group.

In the real universe, reported cases of possible dwarf–dwarf mergers have increased recently (e.g., Martínez-Delgado et al. 2012; Penny et al. 2012; Rich et al. 2012; Amorisco et al. 2014). Distorted H\textsc{i} morphologies and the presence of gaseous tails around starbursting dwarf galaxies have also been attributed to mergers (e.g., Johnson 2013; Nidever et al. 2013). However, direct evidence for an ongoing tidal interaction between objects of roughly similar masses remains rare. Rich et al. (2012) found that the nearby Magellanic irregular galaxy NGC 4449 makes a pair with a tidally disrupted dwarf galaxy. This interaction will lead to a 1:50 merger, whereas UGC 6741 corresponds to a 1:3 merger. In the world of massive galaxies, this would be considered a major merger.

### 3.3. Evolution of Dwarf Galaxies

Several physical properties of UGC 6741, i.e., color, metal content, and SFR, are fairly similar to typical BCDs and there is little doubt that its star formation activity is affected, if not triggered, by the interaction. Once the burst is terminated and the galaxies have merged, which type of dwarf will UGC 6741 resemble? Its position on the scaling relations between structural parameters can give clues to its future evolution.

In Figure 8, we compare its properties with that of samples of non-interacting dwarfs. As a comparison sample, we used the Virgo Cluster BCDs and dEs from Meyer et al. (2014) and Janz & Lisker (2008) respectively.

BCDs occupy a position distinct from dEs in both \(M_\text{r} - \langle \mu \rangle\) and \(M_\text{r} - \text{Re}\) scaling relations. In particular, they have a higher surface brightness than dEs of similar magnitude. UGC 6741, which has a total luminosity similar to the brightest BCDs in the comparison sample, lies within the locus of dEs. Meyer et al. (2014) proposed a formation channel of some dEs through a BCD phase, an evolution scheme that UGC 6741...
may also follow. Yet, given its current SFR of 0.18 $M_\odot$ yr$^{-1}$ and the mass of its gas reservoir estimated from the HI data, its gas depletion time is high (>3 Gyr). Thus, additional processes other than star formation are needed to remove the gas reservoir and make UGC 6741 a gas-poor red and dead galaxy.

Therefore, UGC 6741 appears as a scaled down version of gas-rich massive interacting systems; like the latter, it hosts a prominent long tidal filament hosting young super star clusters that will possibly evolve into globular clusters or UCDS. A further comparison study would require high-resolution optical imaging and spectroscopy and acquiring HI/CO gas maps, in addition to the wealth of multi-wavelength data already available in the archives. Such observations would give clues to the future evolution of the system. Whether gas-rich dwarf–dwarf mergers form dwarf elliptical galaxies the same way as spiral–spiral mergers form massive ellipticals is still an open question. Cosmological simulations have so far given somehow contradicting results on the merger probability in the dwarf population. A statistical census of tidally interacting dwarfs should now be carried out. This was a motivation for us to systematically inspect large-scale imaging surveys such as the SDSS or the NGVS in the Virgo Cluster. Results of this statistical analysis will be presented in future papers (S. Paudel et al. 2015, in preparation).

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