Recycling Intergalactic and Interstellar Matter
IAU Symposium Series, Vol. 217, 2004
Pierre-Alain Duc, Jonathan Braine and Elias Brinks, eds.

On the Nature of Dwarf Galaxies in the Interacting Group HCG 31

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Abstract. We have analysed the morphology, kinematics, colors and chemical composition of the ionized gas of the different objects belonging to the interacting compact group HCG 31 in order to get a global view of the origin and evolution of the dwarf galaxies present in it.

1. Discussion

Optical U, B and V images of HCG 31 were obtained at the 2.56m NOT. We used the 1.55m CST to obtain J, H and Ks NIR images. Intermediate resolution spectroscopy was carried out at the 4.2m WHT. Three different slit positions were observed in order to study the kinematics and chemical composition of the ionized gas. We presented a preliminary analysis of the chemical abundances and the ages of the observed bursts in López-Sánchez & Esteban (2003).

An analysis of bright emission line profiles along each slit position was performed to study the kinematics of the ionized gas. We show the position-velocity (PV) diagrams in Figure 1. We can conclude:

1. C shows a sinusoidal pattern in its center (*Figure 1a*), indicating that a merging process is ongoing in the of A+C complex.

2. B shows a solid-body rotation pattern (*Figure 1a*) that could be affected by a possible tidal streaming motion along the direction towards the A+C complex. G also shows solid-body rotation (*Figure 1b*).

3. E shows a very different behavior between P.A. 133°(*Figure 1b*) and P.A. 128°(*Figure 1c*). We consider that perhaps we are seeing two different kinematical objects that coexists in apparent close proximity: E member (*P.A. 128°*) and a tidal tail extending from the south of A+C complex towards the faint member H (*P.A. 133°*).

4. F1 and F2 seem clearly to be kinematically different from the tidal tail.

The mean velocities of F1 and F2 are similar to that of E and G, which coincides with the radial velocity of the H I cloud (Williams et al. 1991), suggesting that they are related to the arm-like H I structure that extends to the

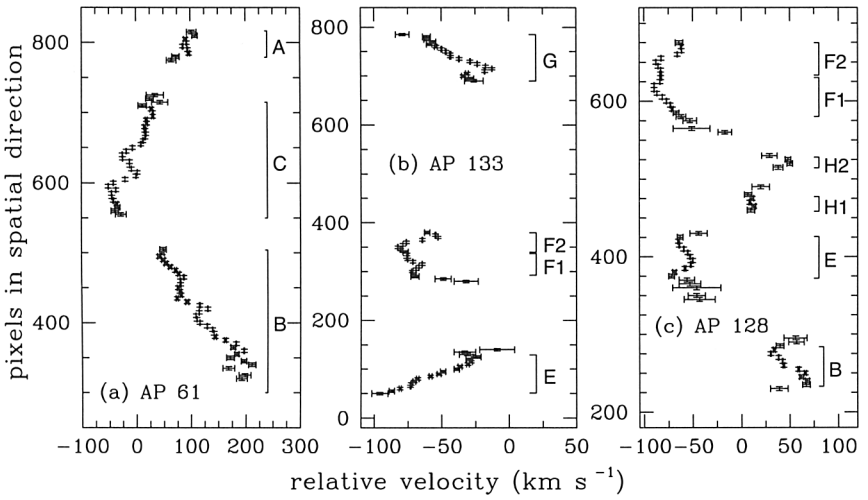

Figure 1. PV diagrams obtained from long-slit spectroscopy.

SE of the A+C complex. The velocity pattern and the morphology of the system are compatible with the presence of two spatially coincident kinematical structures: the arm-like H I structure that extends from A+C toward member G (from which objects E and F may be formed), and the optical tidal tail that emerges from the southwest of the A+C complex (which consists of a curved string of faint star-forming regions that ends at H). The H I extension has a rather constant radial velocity but the optical tidal tail shows a clear streaming motion. We propose that E, F1, and F2 are TDG candidates made by material from the southern arm-like H I extension, which was stripped from the parent galaxy (probably the A+C complex) due to a fly-by encounter between it and G. This hypothesis is both supported by their kinematic patterns and because their relatively high chemical abundances, very similar to those of the brightest galaxies. The apparent absence of an old stellar population in E, F1 and F2 indicates that they are basically made of gaseous material. In fact, a local maximum in the H I distribution coincides with the position of member F.

2. Conclusions

Our data suggest that a strong interaction is necessary between more than two galaxies in order to explain all the observed features in HCG 31. This behavior could be an interesting prototype of interaction between several galaxies, probably very common in high density systems and at high redshift.

References

López-Sánchez, A.R. & Esteban, C. 2003, in *Satellites and tidal streams*, F. Prada and D. Martínez-Delgado (eds), in prep.

Williams, B.A., McMahon, P.M. & van Gorkom, J.H. 1991, AJ, 101, 1957

https://doi.org/10.1017/S0074180900198419 Published online by Cambridge University Press