

Chemical complexity and star-formation in merging galaxies

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Abstract. When galaxies merge the resulting conditions are some of the most extreme found anywhere in nature. Large gas flows, shocks and active black holes all can affect the ISM. Nearby merging galaxies with strong starbursts are the only places where we can conduct detailed study of star formation in conditions that mimic those under which the majority of stars in the universe formed. Here we study molecular gas tracers in 8 galaxies selected from the VIRUS-P Investigation of the eXtreme ENvironments of Starbursts (VIXENS) survey. Each galaxy has also been observed using the integral field unit spectrograph VIRUS-P, allowing us to investigate the relation between the chemical state of the gas, star formation and total gas content. Full details can be found in Heiderman *et al.* (2011). Here we report on new results obtained from IRAM-30m/NRO-45m 3mm line surveys towards 14 positions in these 8 merging galaxies. We detect ≈ 25 different molecular transitions towards these objects, many which have never been observed in these galaxies before. Our measurements show that the mean fraction of dense gas increases in later-stage mergers (Fig. 1, left), as does the average optical depth of the gas. Molecular diagnostic diagrams (Fig. 1, right) show that molecular regions we probe are, in general, UV photon dominated. Triggered AGN activity, and/or cosmic ray ionisation (from SNe II in the starburst) are not yet energetically important in determining the state of the gas.

Keywords. galaxies: starburst — galaxies: ISM — ISM: molecules — astrochemistry

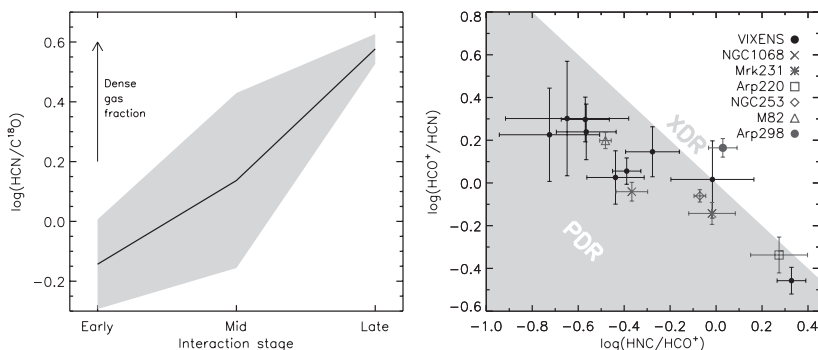


Figure 1. *Left:* Mean HCN/C¹⁸O ratio as a function of interaction stage. *Right:* Molecular diagnostic diagram after Baan *et al.* (2008), including the VIXENS galaxies.

References

- Baan *et al.* 2008, *A&A*, 477, 747
Heiderman *et al.* 2011, in S. Salviander, J. Green, and A. Pawlik (eds.), *New Horizons in Astronomy*, Proc. Frank N. Bash Symposium 2011. (Online: Proceedings of Science)