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BUDHIES: A BLIND ULTRA DEEP HI ENVIRONMENTAL SURVEY

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We present recent results from the Blind Ultra Deep HI Environmental Survey (BUDHIES), that has detected over 150 galaxies at $z \sim 0.2$ with the Westerbork Synthesis Radio Telescope (WSRT). Our multi-wavelength study is the first where optical properties and HI content are combined at a redshift where evolutionary effects begin to show. Our goal is to study the link between the environment, HI content, morphology, stellar mass and star formation in galaxies at $z \sim 0.2$, and the importance of different physical mechanisms in the transformation of galaxies.

Neutral hydrogen (HI) is a crucial tracer of galaxy evolution, as it constitutes the fuel for star formation, and is also a sensitive tracer of environmental processes such as ram-pressure stripping. So far, many studies have explored HI properties in low-z galaxies. However, at $z \geq 0.08$, man-made interference, and long integration times make the observations a harder task. With the WSRT, we have carried out, for the first time, ultra-deep HI observations around 2 clusters at $z \sim 0.2$ (Abell 963 and Abell 2192). Our survey successfully detected > 150 galaxies in and around these clusters (Verheijen et al. 2007; Deshev et al. *in prep.*). We have also carried out a spectroscopic campaign (Jaffé et al. 2013) to study the environments in the surveyed volumes, which revealed a variety of structures (e.g. clusters, groups, and filaments). We then analyze the effect of environment on the HI detections (Jaffé et al. 2012; Jaffé et al. *in prep.*). Our results clearly show that the fraction of HI-detected galaxies correlates with environment at $z \sim 0.2$. The effect starts to kick in in low-mass groups that can start pre-processing the galaxies before they enter the cluster, so that, by the time the group galaxies fall into the cluster, they are already devoid of HI. In the case of Abell 963 (see Fig. 1), a massive virialized cluster, the fraction of HI detections (with $M_{HI} \gtrsim 2 \times 10^9 M_\odot$) clearly correlates with distance from the cluster centre, showing a steep decline of the HI fraction at $r \sim 0.8 \times R_{200}$ that reaches zero at the cluster centre.

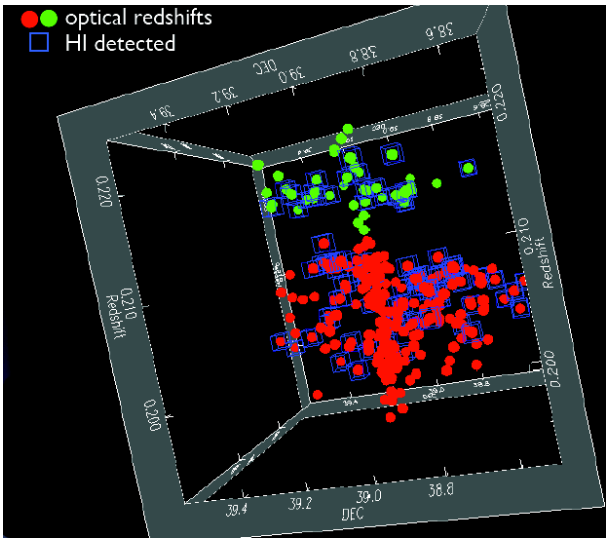

Fig. 1. Distribution of the BUDHIES galaxies with optical spectroscopy (circles) in the ra-dec-redshift space for the most massive ($1.1 \times 10^{15} h^{-1} M_\odot$) cluster in the survey (Abell 963, in red), and a background galaxy group ($1.4 \times 10^{14} h^{-1} M_\odot$, in green) in the same line-of-sight. The HI-detections (blue open cubes) clearly avoid the cluster centre and dominate its outskirts.

We are also studying the HI Tully-Fisher relation evolution from $z = 0.2$ to $z = 0$, and constructing the HI mass function at $z \sim 0.2$, which will also yield a measurement of Ω_{HI}.

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REFERENCES

Jaffé, Y. L., Poggianti, B. M., Verheijen, M. A. W., Deshev, B. Z. and van Gorkom, J. H., 2012, ApJL, 756, 28

Jaffé, Y. L., Poggianti, B. M., Verheijen, M. A. W., Deshev, B. Z. and van Gorkom, J. H., 2013, MNRAS, 431, 2111

Verheijen, M. A.W . van Gorkom, J. H., Szomoru, A., Dwarakanath, K. S., Poggianti, B. M., Schiminovich, D., 2007, ApJ, 668, L9

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