The CFH Optical PDCS Survey (COP): First results

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Abstract. We present in this paper the first results of the COP survey about the reality of the PDCS clusters, about their velocity dispersions and dynamic and about the periodicity of the structures along the line of sight.

1. The data

1.1. Description of the survey

We have made a spectroscopical follow-up of 10 PDCS lines of sight including 15 clusters. These PDCS clusters (Lubin et al. 1996) are optically selected cluster candidates. We have measured about 700 redshifts in 6 nights at CFH with the MOS spectrograph. The expected redshift of these clusters is around 0.4. Two areas of the sky are particularly well covered: 4 lines of sight around 9h and 3 lines of sight around 13h. The sampled redshift range is $z=\{0.0,0.9\}$.

1.2. Are PDCS clusters real?

The first results of this survey show that more than 60% of the candidate clusters are real gravitationally bounded structures with a velocity dispersion ranging from 600 km/s to 1500 km/s.

2. Results

2.1. Dynamic of the clusters

Using the 6 best sampled clusters, we have used the same techniques as were were used for the nearby ENACS clusters (Adami et al. 1998). We plot the variation of the galaxy normalized velocity dispersion versus the absolute magnitude and the morphological type (fig 1: we assume as a first approximation that the em line galaxies are a mix of early and late spirals and that the only absorption line galaxies are a mix of ellipticals and SO). The open symbols are the results for nearby clusters ($z\approx0.05$: Adami et al. 1998) and the filled triangles are for the PDCS clusters ($z\approx0.4$). We see that the two distributions are essentially the same: the evolution of the internal dynamics of the clusters between 0.05 and
Figure 1. (left panel/Open symbols): normalized velocity dispersion vs. R magnitude for the nearby cluster galaxies. We show the relation \( \sigma = 10^{0.2 \text{mag.}} \), normalized at \( R = -21.5 \); (right panel/Open symbols): normalized velocity dispersion vs. morphological type for the nearby cluster galaxies with 1: Ellipticals, 2: SO, 3: Early spirals, 4: Late Spirals; (left and right panel / large filled symbols): \( z \approx 0.4 \) cluster galaxies. (left panel / small filled symbols): results when we split the brighter bin in two bins of 8 galaxies.

0.4 seems to be negligible. At \( z \approx 0.4 \) or \( z \approx 0.05 \), the emission line galaxies are an infalling population while the absorption line galaxies seem to be virialized and the galaxies follow the energy equipartition law (thick line in fig 1 left). The conclusion is that the epoch formation of the clusters is probably significantly greater than 0.4, the clusters continually evolving after with late type galaxies still infalling at low redshifts.

2.2. Periodicity of the structures in the COP survey

The 2 well sampled COP areas (9h and 13h) allow a study of the periodicity along the line of sight. The structures are defined exactly as the ENACS (Katgert et al. 1996). At 9h, we find a periodicity of 90 \( \pm 2 \) Mpc and at 13h the periodicity is 143 \( \pm 10 \) Mpc. Comparing these results with Broadhurst et al (1990) (128 Mpc in another direction), we tentatively conclude that periodicities in the structure distribution are in agreement with the "Web" representation of the Universe and the value of this periodicity depends of the line of sight.

References

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