We present results concerning the occurrence of Seyfert galaxies in a new large sample of Compact Groups (Focardi & Kelm 2002). Seyfert galaxies turn out to be relatively rare (< 3%), with a significant dominance of Sy2. Seyferts are preferentially associated to Compact Groups displaying relatively high velocity dispersion and a large number of neighbours. These characteristics, together with an excess of ellipticals among companions, suggest that Seyferts are to be found preferentially in rich-groups/poor-cluster like CGs.

1 Introduction

Because of their high density (comparable to the galaxy density in clusters) and relatively low velocity dispersion (≈ 200-300 km/s) Compact Groups (CGs) are predicted to constitute the most probable sites for strong galaxy-galaxy interactions and mergers to occur. So far, this general expectation has been tested mainly on the Hickson Compact Group sample (HCGs, Hickson 1982, 1997). Indeed, several HCGs show evidence of ongoing interaction, but component usually remain distinct, with recognizable morphological type (Sulentic 1997). Zepf (1993) has estimated the fraction of currently merging galaxies in HCGs to be ≈ 7%, and the fraction of blue ellipticals (which are plausible merger remnants) to be similarly low (4 in 55), and predominantly associated to faint members (Zepf et al. 1991). Concerning the far infrared (FIR), Hickson et al. (1989) found the FIR emission to be enhanced in HCGs, however Sulentic & de Mello (1993) and Verdes-Montenegro et al. (1998) suggest there is no firm evidence for enhancement. A similar lack of FIR enhancement is found in the UZC-CG sample by Kelm et al. (2002). These authors also state that data are compatible with IRAS galaxies in CGs being plausible candidates for accordant redshift projections, rather than interaction triggered starbursting galaxies.

Addressing the issue of AGNs in HCGs, Kelm et al. (1998) find that only ≈ 2% of the HCG member galaxies display a Seyfert spectrum. They find Sy to be hosted in luminous spirals, as is usually the case. However, computing also low-level AGN activity appears to dramatically increase the fraction of AGNs in CGs (Coziol et al. 1998, 2000), with a significant preference for early type hosts. Coziol et al. (2000) state that AGNs (including low luminosity/dwarf sources) are the most frequent (41%) activity type encountered in CGs. A similar high fraction of AGNs in HCGs is retrieved by Shimada et al. (2000),
who additionally compare AGN in HCGs with field sources and claim that
the dense galaxy environment in HCGs does not affect the triggering of either
AGNs or nuclear starbursts.

2 Seyfert galaxies in CGs: how common are they?

We investigate here the occurrence of AGNs in a new large sample of nearby
Compact Groups (Focardi & Kelm 2002) identified in a 96% complete flux-
limited (2+1)D galaxy catalogue (UZC, Falco et al. 1999). The analysis is
restricted to CGs in the radial velocity range 2500-7500 km/s and to high
excitation Sy (type 1 and 2). Sy are identified through cross correlation with
the Veron-Cetty & Veron (2001) AGN catalogue (V&V) and/or with the NED
database. Out of 639 galaxies in 192 CGs only 16 (2.5%) turn out to be Sy.
The fraction slightly rises restricting computation to spiral hosts (3.3%) or
to the brightest (upper quartile) galaxies in CGs (4.4%). The inclusion of
Sy3/LINERs would enhance the fraction of AGNs to 4.5%, a value still an
order of magnitude lower than estimated by Coziol et al. (2000) or Shimada
et al. (2000).

Among Sy in CGs only 3 are Sy1. For comparison, in the V&V catalogue
the number of Sy1 (within the same redshift range) is only half the number of
Sy2, thus confirming the paucity of type 1 sources in CGs (Coziol et al. 2000).

3 CGs with and without a Seyfert: is there any difference?

Interactions with companion galaxies are predicted to generate instabilities
that will possibly lead to the (re)activation of an active nucleus. CGs identi-
fied in redshift catalogues constitute, by definition, an extremely dense envi-
ronment, however only a minor fraction displays a Sy member. This means
that additional parameters, linked to the exact dynamical status of the group
and/or to the host galaxy internal parameters do control the Sy-triggering
mechanism. Following, we include data analysis indicating that among CGs
those resembling rich-group/poor-cluster appear more likely to host a Sy mem-
ber.

In figure 1-left the velocity distribution of galaxies in CGs with Sy
(SyCGs) and in CGs without Sy (nonSyCGs) is displayed. The figure
shows the distribution of the difference between the observed galaxy radial
velocity and the mean velocity of galaxies in the group to which it belongs.
The majority of velocities fall below 200 km/s in both samples. However it
clearly emerges that galaxies in SyCGs are more likely (at 3 σ c.l. according
to the KS test) than those in nonSyCGs to display larger velocity differences.
In figure 1-right distributions of the number-of-neighbours within an region of $1h^{-1}Mpc$ radius and $|\Delta cz|<1000$ km/s from the CG center are shown, tracing the galaxy number density around CGs on a scale much larger than the CG scale. Statistical analysis indicates that SyCGs are more likely (at 3 $\sigma$ c.l.) than nonSyCGs to be associated to large number of companion galaxies, i.e. they reside in a denser large-scale environment.

In figure 2 the morphological segregation of galaxies in CGs with/without a Sy member are compared. Difference points towards a population in SyCGs richer in ellipticals. However, among Sy themselves only one is an elliptical; accordingly, data indicate that Sy are more common when the fraction of ellipticals among companions is high.

4 Conclusions
We retrieve only a marginal fraction of Sy galaxies in the UZC-CG galaxy sample, suggesting that either the interaction-activity connection does not hold for CGs, or, that most CGs are actually systems undergoing only mild interactions. Significant dynamical and environmental differences between CGs hosting/non-hosting a Sy member might indicate that Sy are typically associated to CGs already resembling rich-groups/poor-clusters. This interpretation is also supported by the fact that an excess of ellipticals is retrieved among companions to Sy. Our analysis clearly suggests that the low fraction of Sy among UZC-CGs galaxies results from a low fraction of physical systems in
the sample. Accordingly, most CGs turn out to be accordant redshift projected groups, or groups at first approach in which no strong interaction has yet occurred.

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