

AGN populations in compact groups of galaxies

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Abstract. Compact groups of galaxies (CGG) have revealed some interesting problems from their origin and lifetime to the evolution of their members in such dense configurations. Some authors suppose that CGG probably are the best location for AGNs in the local Universe. According to our preliminary data about 7–10% of member galaxies in Shahbazian compact groups (SHCGs) are emission-line galaxies including the broad-line AGN and the narrow emission-line galaxies. Shahbazian 355/4 is a classical Seyfert 1 galaxy at the same redshift as host group. Moreover Shahbazian 278/4 is also a broad-line AGN in an early-type galaxy. This is the first emission-line object in SHCGs. Meanwhile there is no Seyfert 1 galaxy among the spectroscopically investigated galaxies in the South compact groups, although more than 70% of the member galaxies in these groups probably have an active nucleus. The UZC- compact groups have an excess of Seyfert 2s (but not Seyfert 1s!). Further observational studies are necessary to understand such and many other questions related to the puzzle of CGG.

Keywords. Shahbazian groups, AGN, Starburst galaxies

Compact groups of galaxies have revealed a number of interesting problems from their origin and lifetime to the evolution of their members in such dense configurations (Hickson (1997) and references therein). Some authors suppose that compact groups of galaxies probably are the best location for AGNs in the local Universe (Coziol *et al.* (2000), Shimada *et al.* 2000). Hickson 31 (Arp 259) is one of the most remarkable compact groups studied till now with two member Markarian galaxies (Rubin *et al.* (1990). HCG 31 (G) is Mrk 1089 with a known Wolf-Rayet (WR) spectrum. HCG 31 (G) is Mrk 1090. This is a starburst galaxy. The redshift of this group is $z = 0.0131$. IRAS 23532 + 2513 with a redshift of 0.056 is an example of a compact group including a Seyfert 1 and a starburst galaxy (Zhen-Long Zou *et al.* (1995).

According to our preliminary data about 7–10% of member galaxies in Shahbazian compact groups are the emission line galaxies including the broad-line AGNs (of classical Seyfert 1 type) and the narrow emission-line galaxies (Tiersch *et al.* (1999), Amirkhanian *et al.* (2010). Their redshift makes these galaxies a physical member of the hosted group. Shahbazian 355/4 is a classical Seyfert 1 galaxy (Fig. 1). (discovered by our research group) at the same redshift ($z = 0.0942$) as hosted group. Moreover Shahbazian 278/4 is also the broad-line AGN in an early-type galaxy. This is the first emission-line object in Shahbazian compact groups discovered by Spanish astronomers (del Olmo and Moles (1991). At the same time there is no Seyfert 1 galaxy among the spectroscopically investigated galaxies in the South compact groups, although more than 70% of the member galaxies in these groups probably have an active nucleus (Coziol *et al.* (2000). Why? The UZC- compact groups have an excess of Seyfert 2s (but not Seyfert 1s!) (Kelm *et al.* (2004). Why? Further observational studies are necessary to understand such and many

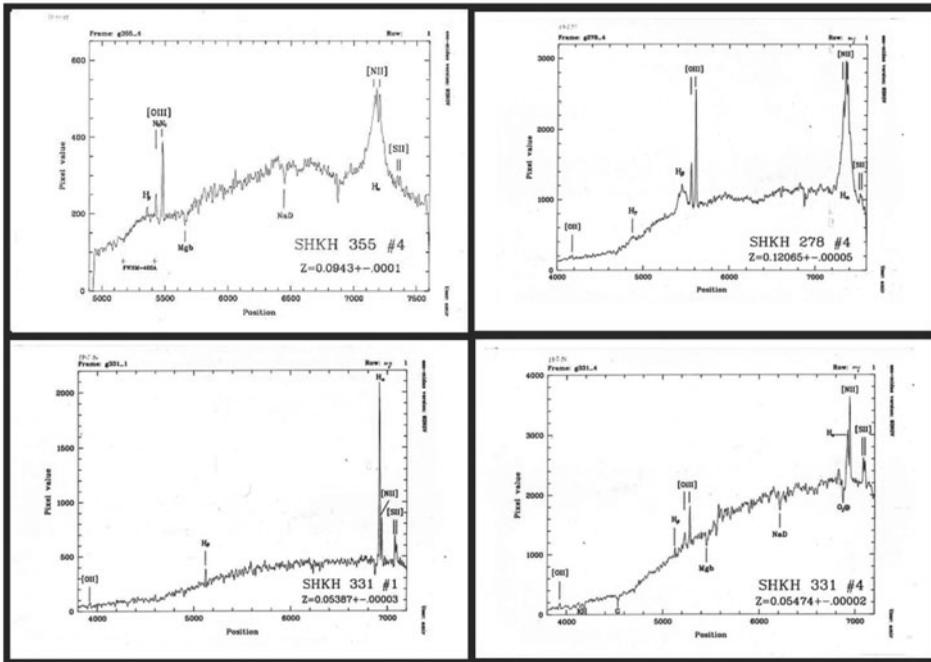


Figure 1. The spectra of some Emission-Line Galaxies (ELGs) in SHCGs. All except one were taken with the 1.5 m Danish telescope at La Silla (Chile). The spectrum of Seyfert 1 galaxy Sh 355/4 was obtained using the 2.2 m telescope at Calar Alto (Almeria, Spain). Original dispersion is 2.9 Å per pixel, integration 3600s.

other questions related with the puzzle of compact groups.

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References

- Amirkhanian, A. S., Egikian, A. G., del Olmo A., & Perea, J. 2010, in: H. Harutyunian, A. Mickaelian and Y. Terzian, (eds.), *Evolution of Cosmic Objects through their Physical Activity*, Proc. of the Conf. dedicated to V. A. Ambartsumian’s 100th anniversary, Yerevan, “Gitutyun” Publ. House, p. 225
- Coziol, R., Iovona, A., & de Carhvalo, R. R. 2000, *AJ* 120, 47
- del Olmo, A. & Moles, H. 1991, *A&A* 245, 27
- Hickson, P. 1997, *ARAA* 35, 357
- Kelm, B., Focardi, P. & Zitelli V. 2004, *A&A* 418, 25
- Rubin, V. C., Hunter, D. A., & Kent Ford, W. Jr. 1990, *ApJ* 365, 86
- Shimada, M. *et al.* 2000, *AJ* 119, 2664
- Tiersch, H., Stoll, D., Neizvestny, S., Amirkhanian, A. S., & Egikian, A. G. 1999, in: Y. Terzian, D. Weedman & E. Khachikian, & (eds.), *Active Galactic Nuclei and Related Phenomena*, Proc. IAU Symposium No. 194 (Chelsea, Michigan: ASP), p. 394
- Zhen-Long Zou, *et al.* 1995, *A&A* 304, 369