

INTERACTION IN TWO CONTRASTING EXAMPLES OF GALACTIC GROUPS

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RESUMEN

Se presentan observaciones de los dos grupos de galaxias 0645-741 y 0019-489. El primer grupo contiene una galaxia de anillo bien conocida, identificada primero por Lindsay y Shapley (1960) y estudiada posteriormente por Graham (1974). El segundo grupo también es conocido como el grupo de Phoenix y está formado por NGC 87, 88, 89 y 92 y fue recientemente estudiado por Rose (1979) y Rose y Graham (1979). Ambos grupos presentan un grado similar de concentración y contienen un número similar de galaxias; parecen haber estado sujetos a interacciones de marea y sin embargo, muestran poblaciones galácticas distintas. El primero consta de galaxias evolucionadas, elípticas y el segundo está formado por espirales jóvenes que muestran formación estelar reciente. La naturaleza de las interacciones de mareas es discutida en el marco de modelos de Lynds y Toomre (1976) y se concluye que la galaxia peculiar de anillo en el grupo 0645-741 y la formación de la espiral peculiar con un brazo extendido del grupo 0019-489 son consecuencia de encuentros galácticos. A partir de las observaciones se concluye que el anillo está inclinado 31° con respecto a la visual y que tiene una velocidad sistémica de 6494 km s^{-1} , una velocidad de rotación de 343 km s^{-1} y una velocidad de expansión de 79 km s^{-1} . El anillo tiene 57 kpc de diámetro, una masa de $8.3 \times 10^{11} M_\odot$ y una edad de aproximadamente 3.5×10^8 años. Estos parámetros son comparables con los que obtuvieron Fosbury y Hawden (1977) para la galaxia Cartwheel. Se señala que el anillo está suficientemente cercano como para ser detectado en 21 cm y así poder derivar la masa de hidrógeno neutro.

ABSTRACT

Observations of the two groups of galaxies 0645-741, 0019-489 are presented. The first group contains a well-known ring galaxy first identified by Lindsay and Shapley (1960) and later studied by Graham (1974). The second group is also referred to as the Phoenix group and consists of NGC 87, 88, 89 and 92 and was recently studied by Rose (1979) and Rose and Graham (1979). Both groups exhibit a comparable degree of compactness and contain similar numbers of galaxies and appear to have undergone tidal interactions; yet, they show markedly different galaxy populations. The former consisting of evolved galaxies, ellipticals and the latter young spirals showing recent star formation. The nature of the tidal interactions is discussed in the context of the models of Lynds and Toomre (1976) and it is evident that the peculiar ring galaxy in group 0645-741 and the formation of the peculiar extended one-armed spiral of the group 0019-489 are consequences of galactic encounters. From the observations it is deduced that the ring is inclined at 31° to the line of sight and has systemic velocity of 6494 km s^{-1} a rotation velocity of 343 km s^{-1} and an expansion velocity of 79 km s^{-1} . The ring is 57 kpc in diameter and has a mass of $8.3 \times 10^{11} M_\odot$ and is approximately 3.5×10^8 years old. These parameters are comparable to those deduced for the Cartwheel by Fosbury and Hawden (1977). It is further pointed out that the ring is sufficiently close to be detected at 21-cm and therefore derive a neutral hydrogen mass from the galaxy.

Key words: GALAXIES-INDIVIDUAL – GALAXIES-CLUSTERS OF

1. Visiting Astronomer, Cerro Tololo Inter-American Observatory, supported by the National Science Foundation, under contract No. AST4-04128.

2. Based on observations collected at the European Southern Observatory, La Silla, Chile.

REFERENCES

- Fosbury, R.A.E. and Hawden, T.G. 1977, *M.N.R.A.S.*, 178, 473.
Graham, J.A. 1974, *Observatory*, 94, 290.
Lindsay, E.M. and Shapley, H. 1960, *Observatory*, 80, 223.
Lynds, R. and Toomre, A. 1976, *Ap. J.*, 209, 382.
Rose, J.A. 1979, *Ap. J.*, 231, 10.
Rose, J.A. and Graham, J.A. 1979, *Ap. J.*, 231, 320.

DISCUSSION

Serrano: Why is it that the gas interacts but the stars do not?

Danks: To some extent the tidal interaction may be responsible for the onset of star formation, creating the necessary density enhancement. The interaction took place about 10^8 years ago and what we see now is emission from H II regions presumably excited by OB-type stars.

Pizmiš: Is it not surprising that the intruder galaxy remains so regular as if it had not undergone any encounter?

Danks: The intruding galaxies in these examples were probably regular before impact; but in any case they are certainly less massive than the target galaxy. The interaction itself most likely stripped them of any spiral arms leaving predominantly a nucleus.

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