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BAR DETECTION IN ISOLATED AND PAIRS OF GALAXIES

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RESUMEN

Estudios recientes han buscado una posible relación entre las barras y las diferentes propiedades de la galaxia huésped, así como la influencia del medio ambiente local (grupos, cúmulos, supercúmulos). Hemos calculado la fracción de barras en dos muestras donde los efectos causados por el medio ambiente local están bien controlados: una submuestra de 180 galaxias aisladas del catálogo UNAM-KIAS obtenidas del SDSS DR5 y una submuestra de 160 galaxias en pares del catálogo KPG obtenidas con el telescopio de 1.5 m OAN-SPM. Presentamos resultados preliminares de la fracción de barras detectadas en ambas muestras así como una comparación con otros medio ambientes tales como grupos y cúmulos, lo cual pareciera indicar que dicha fracción no es el resultado de las interacciones entre galaxias o bien estas interaciones las debilitan o destruyen.

ABSTRACT

Recent studies have been carried out to find out the dependence between bars and different properties of the host galaxy, and the influence of the local environment (groups, clusters, superclusters). We calculated the fraction of bars in two samples where the environmental effects are well controlled: a subsample of 180 isolated galaxies from the UNAM-KIAS catalogue obtained from SDSS DR5 and a subsample of 160 galaxies in pairs from the KPG catalogue obtained with the OAN-SPM 1.5 m telescope. We present preliminary results of bar fraction detected between these controlled environments and other environments such as groups and clusters that points towards bars are likely not triggered by galaxy interactions or maybe they are destroyed/weakened by them.

Key Words: galaxies: evolution — galaxies: fundamental parameters — galaxies: structure

Bars are elongated stellar structures located in the central regions of disk galaxies (Blanton & Moustakas 2009) and they are present in a heterogeneous class of galaxies (Sellwood & Wilkinson 1993). Bars constitute a major non-axisymmetric component of the energy, mass, and angular momentum redistribution of the baryonic and dark matter components in the galaxy that plays an important role in their dynamic and secular evolution. In fact, the amount of angular momentum exchanged is related to specific properties of the galaxies (bar mass, halo density, and halo velocity dispersion) as well as bar parameters, length, strength, and pattern speed (Gadotti 2010; Sellwood & Wilkinson 1993; Marinova & Jogee 2007; Aguerri et al. 2009; van der Kruit & Freeman 2011).

Environmental dependences of galaxy properties other than morphology have also been studied to measure the environmental effects on various physical properties of galaxies. Simulations suggest that strong interactions can trigger the formation of a bar, in accordance with observations that show that bars are two times more likely to be present in perturbed galaxies (i.e., galaxies with a nearby companion), relative to isolated galaxies (Park et al. 2007), however, there are no publications describing a large-scale exploration of whether the detailed nature of the bulges or the presence of a bar is otherwise strongly related to environment (Blanton & Moustakas 2009).

We have used two samples for our analysis: images in the g, i SDSS system from a subsample of 180 isolated galaxies from the UNAM-KIAS catalogue (Hernández-Toledo et al. 2010) and B, I images in the Johnson-Cousin system obtained with the OAN-SPM 1.5 m telescope from a subsample of 160 galaxies in pairs from the KPG catalogue (Catalogue of Isolated Pairs of Galaxies, Karachentsev 1972).

The UNAM-KIAS catalogue is conformed by 1520 isolated galaxies from the Sloan Digital Sky Survey Data Release 5 (SDSS) (Stoughton et al. 2002) with a selection criteria that is a variation on the criteria developed by Karachentseva that guarantees isolation. Our sample of 160 pairs have morphologies of the (S+S) and (S+E) types and are selected from the KPG catalogue. It was selected with a strong isolation criteria where only very small neighbors are allowed around each component and

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