RevMexAA (Serie de Conferencias), **35**, 227–228 (2009)

ROTATION CURVES IN (E+S) ISOLATED GALAXY PAIRS

E. M. Huerta[1] and J. J. González[2]

RESUMEN

Como parte de una amplia investigación para cuantificar los efectos de interacción en la evolución de galaxias de disco, medimos las curvas rotación de 102 galaxias espirales en pares de morfología mixta (E+S), tomadas del catálogo de Karachantsev de pares aislados de galaxias. En este resumen solamente presentamos las curvas de rotación características de espirales en pares aislados (E+S) con el objetivo de compararlas, en un futuro, con espirales aisladas en un diagrama Tully-Fisher.

ABSTRACT

As part of a broad investigation to quantify the effects of interaction in the evolution of disk galaxies, we measured rotation curves of 102 spirals in mixed morphology pairs (E+S), drawn from the Karachantsev catalogue of isolated pairs of galaxies. In this summary we simply present characteristic rotation curves of spirals in isolated (E+S) pairs, in preparation for a future comparison with isolated spirals in a Tully-Fisher diagram.

Key Words: galaxies: kinematics and dynamics

1. INTRODUCTION

Isolated disk galaxies define a very strong and narrow correlation between mass and luminosity – Tully & Fisher (1977). In particular, the galaxy mass is typically derived from the maximum amplitude of its rotation curve. In this project, the rotation curves of disk galaxies in isolated pairs were obtained, as the first step to quantify the effects of interaction in the evolution through the Tully-Fisher relation (e.g., Barton et al. 2001). About 120 of the pairs in the catalogue of Isolated Pairs of Galaxies in the Northern Hemisphere (Karachentsev 1972) are of clear (E+S) mixed morphology (Hernández Toledo 1999), and we observed 102 of them.

In these simple systems, any excess in stellar formation induced by interactions is expected to be more evident in the disk galaxy, because it contains most of the cold gas in a pair where the elliptical mostly plays the role of the sole main perturber. Furthermore, being disks more fragile to perturbations than the dynamically hot elliptical, we thus expect to better isolate and quantify the interaction effects in the spiral member of the pair.

2. DATA AND RESULTS

We obtained long-slit ($2' \times 1.4''$) spectra of the 102 spirals in isolated (E+S) pairs with the 2.1 m telescope of the Observatorio Astronómico Nacional, San Pedro Mártir, Baja California, México. Observations were centered on H$\alpha\lambda$6563, resolving the adjacent [NII] λ6548 and λ6583, with a coverage including HeI λ5876, [OI] λ6364 and the [SII] λ6716 λ6731 doublet. Using the VISTA reduction package, raw images were treated using a standard CCD reduction pipeline that apply first a bias correction, followed by a flat-field correction derived from dome and internal incandescent lamps. The next steps properly transform data from the distorted detector space to orthogonal physical dispersion and spatial coordinates. 2-D relative flux calibration was achieved from standard stars combined with the slit illumination of telluric emission.

Finally, from the spectra along the galactocentric distance, mashed to a minimal S/N of 30 per angstrom in the continuum, we measured the intensities, widths and velocities (rotation curve) of the emission lines. After subtracting the absorption spectrum (from an scaled template fit), the Hα, [NII], [SII] and [OI] narrow emission lines were fit with Gaussian profiles (all sharing the same width and velocity). A residual Hα absorption, as well as a potential nuclear broad component, were fit with a Lorentzian profile instead. A general non-linear least-squares routine (also within VISTA) was used for these purposes, where it was also verified that the formal errors from the fit were consistent with the actual photon plus read-out noise properly propagated through the reduction steps.

[1]Centro de Radioastronomía y Astrofísica, Universidad Nacional Autó-noma de México, Apdo. Postal 3-72, 58090, Morelia, Michoacán, México (e.huerta@astrosmo.unam.mx).

[2]Instituto de Astronomía, Universidad Nacional Autó-noma de México, Apdo. Postal 70-264, 04510, México D.F., México (jesus@astroscu.unam.mx).

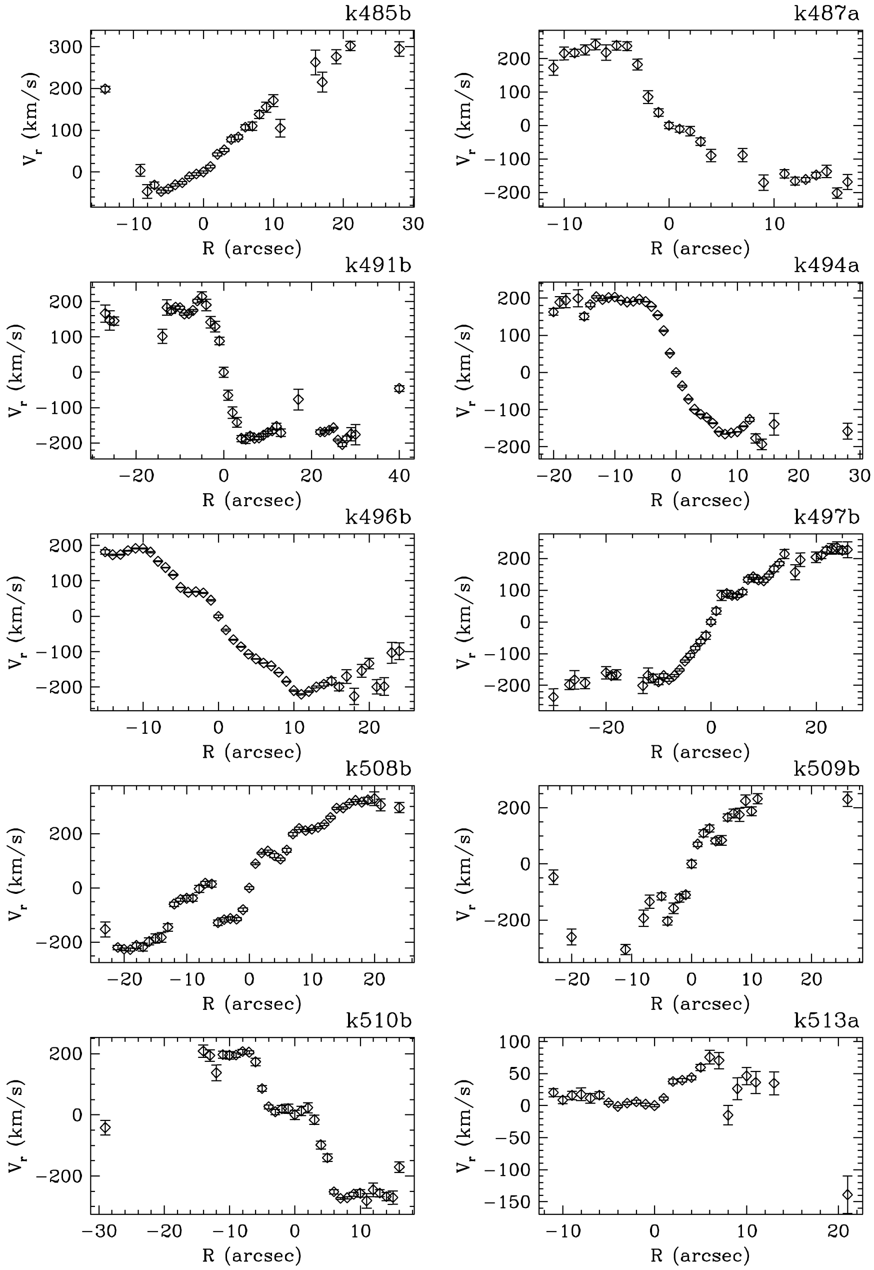

Fig. 1. Typical rotation curves of disk galaxies in mixed morphology (E+S) galaxy pairs from the Karachentsev catalogue. Perturbation effects are present. Reliable masses are soon to be derived from these high-quality data.

Figure 1 presents typical rotation curves among the 102 spirals in our (E+S) isolated pair sample, showing the quality of the data and the presence of some kinematic perturbations. In a future publication we will discuss the mass derivation from these rotation curves a the mass-luminosity diagram, as part of a series of studies to quantify the role of interaction in the evolution of spirals and AGNs.

REFERENCES

Barton, E. J., Geller, M. J., Bromley, B. C., van Zee, L., & Kenyon, S. J. 2001, AJ, 121, 625

Hernández Toledo, H. M., 1999, in ASP Conf. Ser. 163, Star Formation in Early Type Galaxies, ed. P. Carral & J. Cepa (San Francisco: ASP), 279

Karachentsev, I. D. 1972, Soobshch. Spets. Astrofiz. Obs., 7, 1

Tully, R. B., & Fisher, J. R. 1977, A&A, 54, 661