

Part 10

**Low Surface Brightness
Galaxies**

A 3D Optical Spectroscopy Study of Low Surface Brightness Galaxies

L. Chemin^{1,2}, P. Amram³, C. Carignan¹, C. Balkowski², W. van Driel², V. Cayatte², O. Hernandez^{1,3}, J. Boulesteix³, M. Marcelin³

¹ *Dept. de Physique, Université de Montréal, C.P. 6128, Succ. Centre-ville, Montréal, Qc, Canada, H3C 3J7*

² *GEPI, Observatoire de Paris, 5 Pl. J. Janssen, 92195 Meudon, France*

³ *Observatoire Astronomique de Marseille-Provence, 2 Pl. Le Verrier, 13248 Marseille, France*

Abstract. We present H α emission line velocity fields of two Low Surface Brightness galaxies (LSBs) - UGC 628 and UGC 5005 - obtained using Fabry-Perot (FP) interferometry observations at the Canada-France-Hawaii telescope. Our goal is to study the dynamics of LSBs.

1. Introduction

Low Surface Brightness galaxies are ideal laboratories to study the dark matter (DM) properties and it is still debated whether their dark haloes are cuspy or core-dominated (de Blok et al. 2001, Marchesini et al. 2002, Swaters et al. 2003).

FP interferometry is a powerful tool for studying the DM properties of LSBs for two major reasons:

- the accurate determination of the DM distribution in galaxies requires high angular resolution observations (see e.g., Blais-Ouellette et al. 1999),
- 3D spectroscopy like FP provides more accurate kinematical parameters and rotation curves than long-slit observations as it samples the whole velocity field of a galaxy.

Using a new generation of detectors with unprecedented sensitivity (Gach et al. 2002), we began a campaign of FP observations of LSBs in order to study the kinematics of the ionized gas and their dynamics (Chemin et al. in prep).

2. Observations, results and discussion

The H α emission line in UGC 628 and UGC 5005 was observed in October 2002 and April 2003 (resp.) at the Canada-France-Hawaii telescope, using FaNTOMM¹, a scanning FP interferometer coupled with a photon counting camera. The angular resolution is 0.49'' and the spectral sampling is 7 km/s for UGC 5005 and 16 km/s for UGC 628. Exposure times are of the order of 3h per galaxy.

Figures 1 and 2 present some provisional results. Figure 1 shows the velocity fields of UGC 628 and UGC 5005. Figure 2 shows the mass models (Blais-

¹<http://www.astro.umontreal.ca/fantommm>

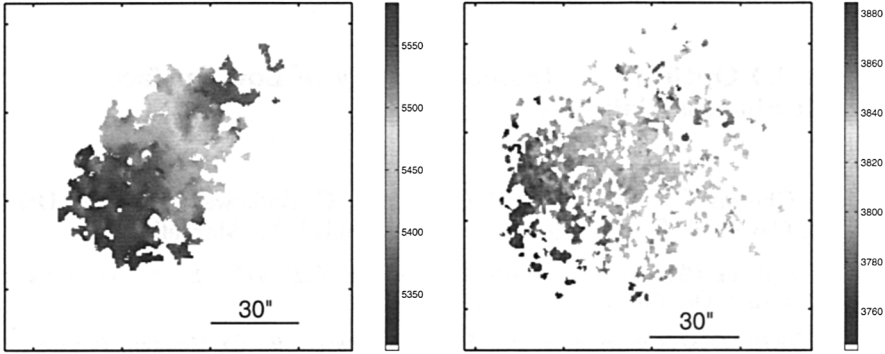


Figure 1. $H\alpha$ velocity field of UGC 628 (left) and UGC 5005 (right). Helio-centric velocities are in km/s.

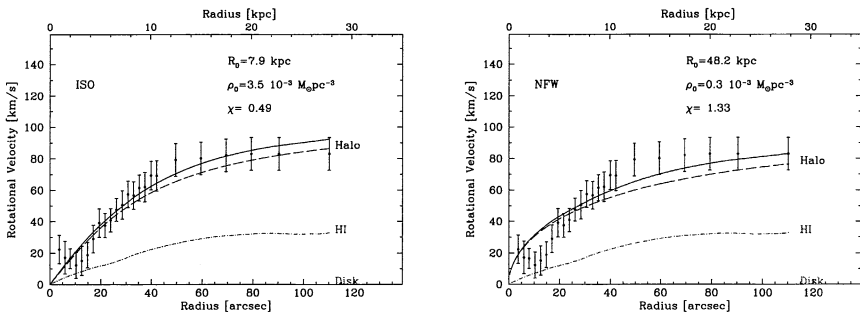


Figure 2. Best fit mass models of UGC 5005. Full circles represent the observed rotation curve, combining our $H\alpha$ points for $R < 45''$, and HI observations elsewhere (van der Hulst et al. 1993). A blue dashed line and a red dotted-dashed line are the rotation curves of the halo and the gas components (resp.). A full line represents the total fitted rotation curve. For each model, the deduced halo parameters and the χ value are indicated.

Ouellette et al. 2001) for UGC 5005 with the pseudo-isothermal (ISO) sphere (left) and the NFW (right) DM halo profiles.

A dozen objects have been observed to date. The high angular resolution FP observations will allow a detailed study of LSB velocity fields and rotation curves and their DM content. We will also study the effects of non-circular motions on their mass distribution (Chemin et al. in prep).

References

- Blais-Ouellette, S., et al. 1999, AJ, 118, 2123
- Blais-Ouellette, S., Amram, P., & Carignan, C. 2001, AJ, 121, 1952
- de Blok, W. J. G., McGaugh, S. S., & Rubin, V. C. 2001, AJ, 122, 2396
- Gach, J.-L., et al. 2002, PASP, 114, 1043
- Marchesini, D., et al. 2002, ApJ, 575, 801
- Swaters, R. A., et al. 2003, ApJ, 583, 732
- van der Hulst, J. M., et al. 1993, AJ, 106, 548