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VLT/VIMOS Integral field kinematics of the Giant Low Surface Brightness galaxy ESO 323-G064

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Abstract.
We studied the bulge and the disk kinematic of the giant Low Surface Brightness (LSB) galaxy ESO 323-G064 in order to investigate its dynamics and its Dark Matter (DM) content. We observed the galaxy with the integral field spectroscopy (VLT/VIMOS, in IFU configuration). Results for the gaseous kinematics (bulge and disk) and stellar kinematics (bulge) are presented, together with a Jeans model for the stellar bulge kinematics.

1. The giant low surface brightness galaxy ESO 323-G064

Introduction LSB galaxies play a significant role in our understanding the bright and DM distribution in the universe. Like high surface brightness galaxies, LSB galaxies also span a range in properties such as size, mass, and bulge size. For example, Bothun et al. (1990) discovered a class of giant LSB galaxies, and Beijersbergen et al. (1999) studied a sample of bulge-dominated LSB galaxies. To date, very little is known of the properties of this new class of objects. To fill this gap, Swaters & Rubin (in preparation) have recently completed a survey of the kinematics of a sample of bulge dominated LSB galaxies to study their DM content and distribution. Here we show the first results obtained for the giant LSB galaxy ESO 323-G064 (at a distance of 198 Mpc), selected from that project.

Observations Observations of ESO 323-G042 had been carried out with VIMOS equipped with Integral Field Unit at the Very Large Telescope (Chile). The high resolution blue grism was used, with a spatial resolution 0.67×0.67/fiber, a spectral resolution of ≈75 km s^{-1}, covering the spectral range 4120–5460 Å. The total exposure time is 4 hours.

Gaseous kinematics The bulge ($R < 5''$) is characterized by complex emission-line structure: the emission lines show a multi-peaked profile (Figure 1A). The disk ($13'' < R < 30''$) of the galaxy shows more regular rotation (Figure 1B), with an amplitude of 248±6 km s^{-1} (Figure 1C).

Stellar kinematics The stellar velocity and velocity dispersion have been measured in the bulge $5''$, unveiling a regular rotation with an observed amplitude of 140 km s^{-1} and a central velocity dispersion of $\sigma = 180$ km s^{-1} (Figure 1D). The stellar kinematics have been modeled with spherical isotropic Jeans models, exploring the self consistent and the DM scenarios, Navarro, Frenk and White (NFW, 1990) and pseudo isothermal halo. The limited radial extent of the stel-

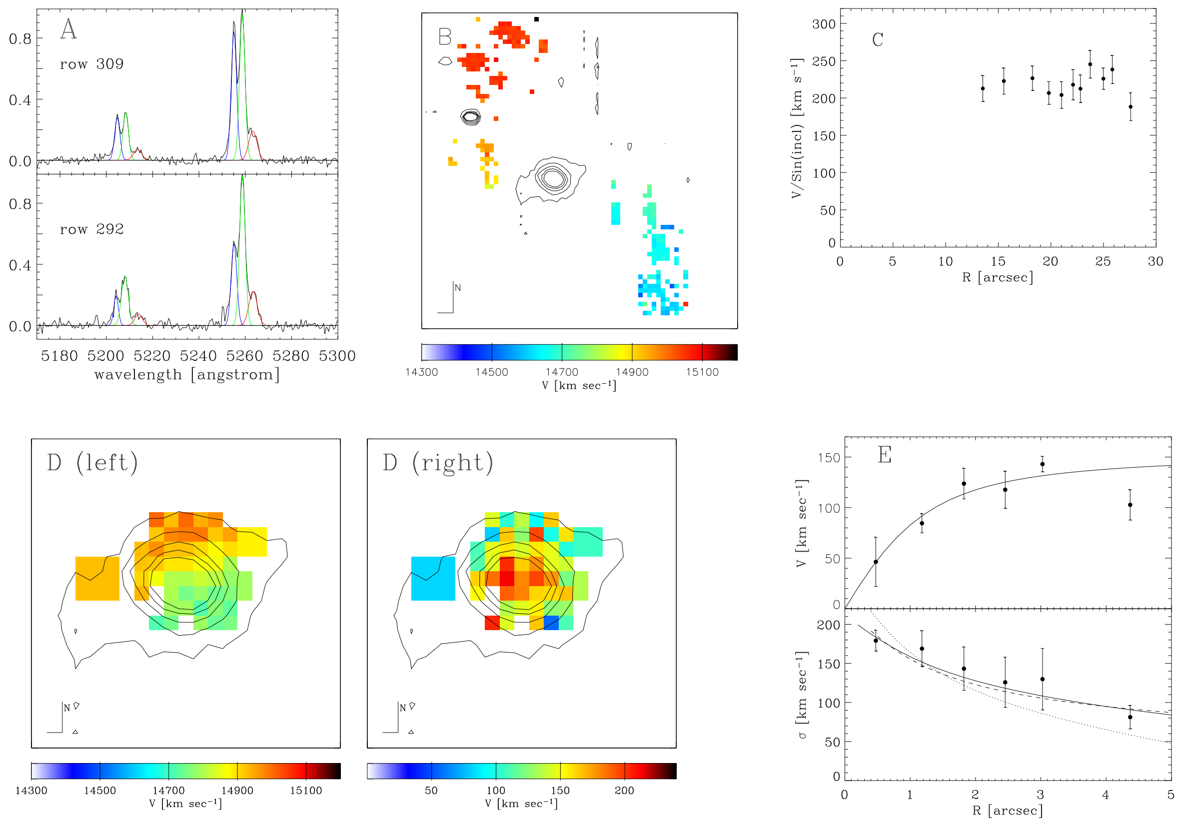

Figure 1. A: example of redshifted [O III] emission lines in the bulge with multiple peaks. B: Velocity field of the Hβ emission line in the disk. Field of view is $46'' \times 46''$. C: rotation curve extracted from B. D: stellar velocity (left) and velocity dispersion (right) of the bulge Field of view is $14'' \times 14''$. E: stellar rotation curve (top) and velocity dispersion profile (bottom) of the bulge with Jeans models superposed: self consistent case (dotted line), NFW (continuous line) and pseudo-isothermal halo (dashed line).

lar kinematics did not allow us to extend the models to the disk component and to consider more complicated scenarios (i.e., anisotropy or bars). Our relatively simple Jeans modeling shows that dark matter is needed in the central $5''$ to explain the bulge kinematics, but we are not able to disentangle between different DM scenarios (Figure 1E). In particular, the total mass of the bulge (within $5''$) is $(7.4 \pm 3.2) \cdot 10^{10}$ M$_\odot$ (DM fraction 55%) and $(7.1 \pm 3.6) \cdot 10^{10}$ M$_\odot$ (DM fraction 42%) according to the NWF and pseudo isothermal scenarios, respectively.

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