

The Many Vortexes of NGC 5236 Nucleus in The Central 80×200 Parsecs

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Abstract. GEMINI-S+CIRPASS configuration has been used to obtain 490 high quality spectra, centred in 1.3 microns of the NW-SE oriented, central 80×200 pc of NGC 5236 (M83), with spectral resolution of 3200. We determine the kinematics of this region with 0.36 arcsec sampling, sub-arcsec resolution. Disk-like motions are detected in $\text{Pa}\beta$ at parsec scales around: a) the optical nucleus (ON), b) the dynamical centre of the CO velocity map (Sakamoto *et al.* 2004) coincident with the K-band center (hereafter KC; Thatte *et al.* 2000), located 50 pc to the W of the optical nucleus, and c) the hidden condensation (hereafter HN; Mast *et al.* 2006), now more precisely located at 120 pc to the N-NW of the optical nucleus. The disk around ON has a radius of 10–15 pc and those around KC and HN can be traced approximately up to 40–50 pc from their kinematical centres. Rotation curve fittings using Satoh like spheroids give masses of $2\text{--}4 \times 10^6 M_{\odot}$, $10\text{--}15 \times 10^6 M_{\odot}$ and $15\text{--}20 \times 10^6 M_{\odot}$ respectively. N-body simulations using Gadget2 (Springel, 2005) show that ON, KC and HN will merge in 20–50 Myrs. A question that arise immediately is if this degree of dynamical activity is peculiar of M83 or it is a common behaviour, seen in this galaxy in all its dramaticity due to its small distance from us.

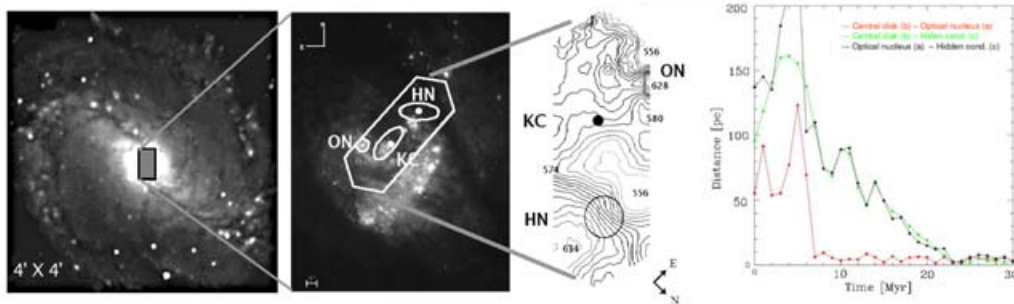


Figure 1. From left to right: a) Large scale image of M83; b) Hst image of the central part outlining the CIRPASS field; c) $\text{Pa}\beta$ isovelocity contours, showing the positions of ON, KC and HN; d) Time evolution of the distance KC–ON, KC–HN and ON–HN, from one of our N-body simulations: all structures will merge in 23 Myr.

References

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