

The Ying and Yang of the M 83 Nucleus

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The spiral galaxy M 83, an SB(rs)b at only 4.5 Mpc, is a privileged case for study of the detailed physics on spatial scales of a tenth of a parsec. With 3-D spectroscopic observations using CIRPASS on Gemini-S, we studied the ionized gas properties in J -band with spatial resolution of $0''.5$ (Figure 1). The Pa β velocity field shows two dynamical centers, neither of them coincident with the bulge center, identified with the optical nucleus (ON) and the hidden nucleus (HN), with masses, within a radius of 10 pc, of $M_{\text{ON}} = (1.8 \pm 0.4) \times 10^7 M_{\odot}$ and $M_{\text{HN}} = (1.0 \pm 0.4) \times 10^7 M_{\odot}$. Using the Pa β equivalent width together with population synthesis models, we are able to estimate the ages of both mass concentrations, $T_{\text{ON}} = 8$ Myr and $T_{\text{HN}} = 6$ –7 Myr. Adding complexity to this puzzling scenario, we used GMOS+Gemini imaging and spectroscopy to study the radio source J133658.3–295105 (Dottori *et al.* 2008) and find that H α emission at the position of this source is redshifted by ~ 130 km s⁻¹ with respect to an M 83 H II region, leading us to face the possibility of that we are witnessing the ejection of an object by gravitational recoil from the M 83 nucleus. A fit to the X-ray spectrum obtained *Chandra* supports the association between this source and the disk of M 83 by the presence of the Fe K α line at 6.7 keV.

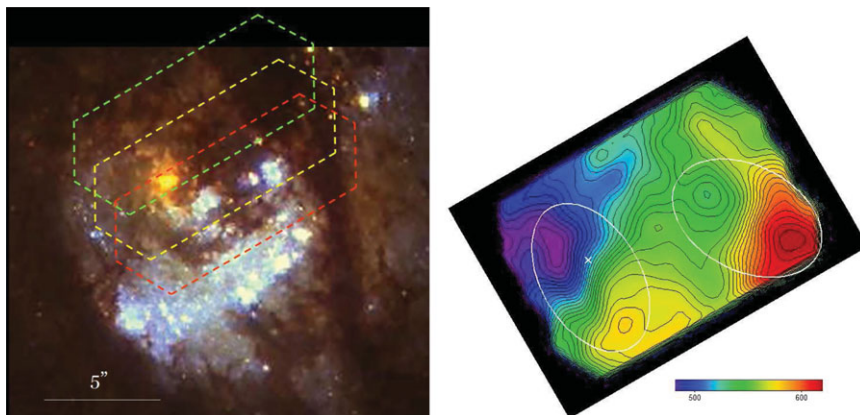


Figure 1. *Left:* The nuclear region of M 83 with the three CIRPASS fields superimposed (PA 120°). North is up. *Right:* The Pa β radial velocity field. The isovelocity contours are traced each 5 km s⁻¹. Two ellipses mark regions where disk-like rotation around a mass concentration is detected. A cross marks the position of the optical nucleus. The scale is in km s⁻¹.

Reference

Dottori, H., Díaz, R., & Mast, D. 2008, *AJ*, 136, 2468