Co-Evolution of Central Black Holes and Galaxies
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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 Paβ 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 $M_{\rm ON} = (1.8\pm0.4)\times10^7\ M_\odot$ and $M_{\rm HN} = (1.0\pm0.4)\times10^7\ M_\odot$. Using the Pa$\beta$ equivalent width together with population synthesis models, we are able to estimate the ages of both mass concentrations, $T_{\rm ON}$ = 8 Myr and $T_{\rm HN}$ = 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 Hα emission at the position of this source is redshifted by $\sim$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 Kα line at 6.7 keV.

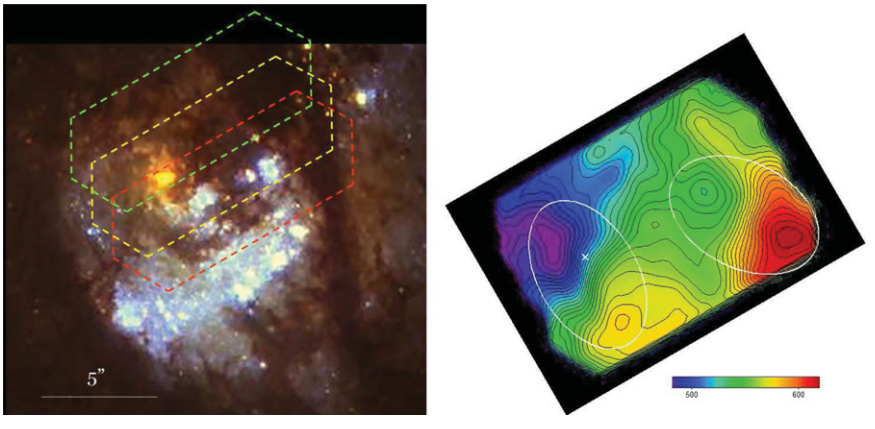

Figure 1. *Left:* The nuclear region of M 83 with the three CIRPASS fields superimposed (PA 120°). North is up. *Right:* The Paβ radial velocity field. The isovelocity contours are traced each 5 km s^{-1}. Two ellipses mark regions where disk-like rotation around a mass concentration is detected. A cross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