Co-Evolution of Central Black Holes and Galaxies
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Searching for the Supermassive Black Hole in NGC 1265 (3C 83.1B)

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We present K-band adaptive-optics assisted spectroscopic observations of the central region of the archetype head-tail radio galaxy NGC 1265 (3C 83.1), with the aim of constraining the mass of the supermassive black hole ($M_{\rm BH}$). The near-infrared data taken with the Altair–NIRI system on the Gemini North have a spatial resolution of FWHM = 0.″11 (39 pc, at the galaxy's distance of 73 Mpc).

To account for the stellar contribution, we performed a multi-gaussian expansion (MGE, Cappellari 2002) by using a combination of our NIRI high-resolution K-band image and a TNG K'-band image (Marchesini *et al.* 2005) to cover the outer parts of the galaxy. We extracted the stellar kinematics by using the penalized pixel fitting method (pPXF, Cappellari & Emsellem 2004) from the CO absorption bands at 2.29 μm. We applied the Jeans anisotropic models (JAM, Cappellari 2008) to the data to determine the best fitting values for $M_{\rm BH}$. The limited quality of our kinematical data did not allow us to measure very extended kinematics. Hence, we resorted to assuming fixed values for both the $(M/L)_K$ and the anisotropy β, using the results by Cappellari *et al.* (2006, 2007). The derived upper limit on $M_{\rm BH}$ ranges between $1 \times 10^9\ M_\odot$ and $3.45 \times 10^9\ M_\odot$ depending on the values on the values of β and $(M/L)_K$, respectively. This range of masses is consistent with the $M_{\rm BH}$–$L_{K,\rm bulge}$ relation of Marconi & Hunt (2003).

With the addition of new kinematical data mapping the outer region of NGC 1265, we will be able to better constrain $(M/L)_K$ and to obtain a higher confidence value for $M_{\rm BH}$. These new observations have been recently obtained with the Oxford SWIFT spectrograph on the Hale 5-m telescope at Palomar Observatory.

References

Cappellari, M. 2002, *MNRAS*, 333, 400
Cappellari, M. & Emsellem, E. 2004, *PASP*, 116, 138
Cappellari, M., *et al.* 2006, *MNRAS*, 366, 1126
Cappellari, M., *et al.* 2007, *MNRAS*, 379, 418
Cappellari, M. 2008, *MNRAS*, 390, 71
Marchesini, D., Capetti, A., & Celotti, A. 2005, *A&A*, 433, 841
Marconi, A. & Hunt, L. K. 2003, *ApJ*, 589, L21