Co-Evolution of Central Black Holes and Galaxies
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The Ultraviolet Flare at the Center of the Elliptical Galaxy NGC 4278

A. Cardullo[1], E. Dalla Bontà[1], E. M. Corsini[1], A. Beifiori[1], L. Buson[2], L. Morelli[1], A. Pizzella[1], and F. Bertola[1]

[1]Dipartimento di Astronomia, Università di Padova, Padova, Italy
Email: andrea.cardullo@unipd.it

[2]INAF, Osservatorio Astronomico di Padova, Padova, Italy

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A large fraction of otherwise normal galaxies shows weak nuclear activity. One of the signatures of the low-luminosity active galactic nuclei (LLAGNs) is the ultraviolet variability which was serendipitously discovered in the center of some low-ionization nuclear emission-line region (LINER) galaxies (see Ho 2008 for a review).

There is a pressing need to acquire better statistics about UV flaring and variability in galaxy nuclei, both in terms of the number and of monitoring of targets. Therefore, we searched the *Hubble Space Telescope (HST)* science archive for the nuclei of elliptical galaxies with images obtained at different epochs with the Wide Field Planetary Camera 2 (WFPC2) to detect the presence of UV variability. NGC 4278 was the only galaxy with multi-epoch WFPC2/F218W images that was not studied previously. The UV flux of the nuclear source of NGC 4278 was measured by means of aperture photometry on the images obtained between June 1994 and January 1995. The nucleus hosts a barely resolved but strongly variable UV source. Its UV luminosity increased by a factor of 1.6 in a period of 6 months. The amplitude and scale time of the UV flare in NGC 4278 are remarkably similar to those of the brightest UV nuclear transients which have been found earlier in other LLAGNs. A nuclear spectrum obtained with the Space Telescope Imaging Spectrograph (STIS) in the Hα region was also available in the *HST* archive. The mass of the central supermassive black hole (SBH) was estimated by measuring the broad components of the emission lines observed in the STIS/G750M spectrum and assuming that the gas is uniformly distributed in a sphere. The mass of the SBH was found to be in the range between 7×10^7 and 2×10^9 $M_\odot$. This is in agreement with previous findings based on different assumptions about the gas distribution (Beifiori *et al.* 2009) and with the predictions based on the galaxy velocity dispersion (Ferrarese & Ford 2005). The full analysis is provided by Cardullo *et al.* (2009).

According to Giroletti *et al.* (2005), the SBH of NGC 4278 is active and able to produce the relativistic jets, which are responsible for most of the emission at optical and radio frequencies of this LLAGN. The AGN interpretation is a promising way to explain the UV variability. In fact, all the LINER nuclei with multi-epoch observations and a detected radio core are characterized by a UV variable source (Maoz *et al.* 2005). This is the case of NGC 4278 as well, suggesting that UV variability could provide the missing link between LINERs and true AGN activity.

References

Beifiori, A., Sarzi, M., Corsini, E. M., Dalla Bontà, E., Pizzella, A., Coccato, L., & Bertola, F. 2009, *ApJ*, 692, 856

Cardullo, A., Corsini, E. M., Beifiori, A., Buson, L., Dalla Bontà, E., Morelli, L., Pizzella, A., & Bertola, F. 2009, *A&A*, in press [arXiv:0909.4048]

Ferrarese, L. & Ford, H. 2005, *Space Science Reviews*, 116, 523

Giroletti, M., Taylor, G. B., & Giovannini, G. 2005, *ApJ*, 622, 178

Ho, L. C. 2008, *ARAA*, 46, 475

Maoz, D., Nagar, N. M., Falcke, H., & Wilson, A. S. 2005, *ApJ*, 625, 699