The Interplay among Black Holes, Stars and ISM in Galactic Nuclei
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The central regions of M 51 observed with HST/STIS†

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Abstract. As part of a larger program to study spatially resolved jet / interstellar medium interactions in nearby Seyfert galaxies, we have obtained high spatial resolution spectrographic observations of the central regions of M 51 and its extra-nuclear cloud (XNC, Ford et al. 1985), using STIS on-board the Hubble Space Telescope (HST). In this paper, we present very preliminary results from these observations.

1. Introduction

The central regions of M 51 host a bubble-like structure located a few arcseconds south-east of the nucleus: the XNC (extra-nuclear cloud, Ford et al. 1985). This structure is probably tracing the interaction between a radio jet and the interstellar medium, since there is a morphological association between the emission-line and radio emission distributions (Ford et al. 1985; Cecil 1988). The ionized gas displays disturbed kinematics (Cecil & Rose 1984; Cecil 1988), observed line ratios in the vicinity of the XNC are consistent with emission from shocks (Bradley, Kaiser & Baan 2004) and the X-ray emission is conistent with emission from hot plasma (kT = 0.5 keV, Terashima & Wilson 2001). Taking advantage of the proximity of M 51, and aiming at studying in detail the XNC and the nuclear regions of the galaxy, we have obtained HST/STIS spectroscopy of this object along four adjacent slit positions using the G430L and G750M configurations. In the following, we focus on the XNC and present very preliminary results from these observations.

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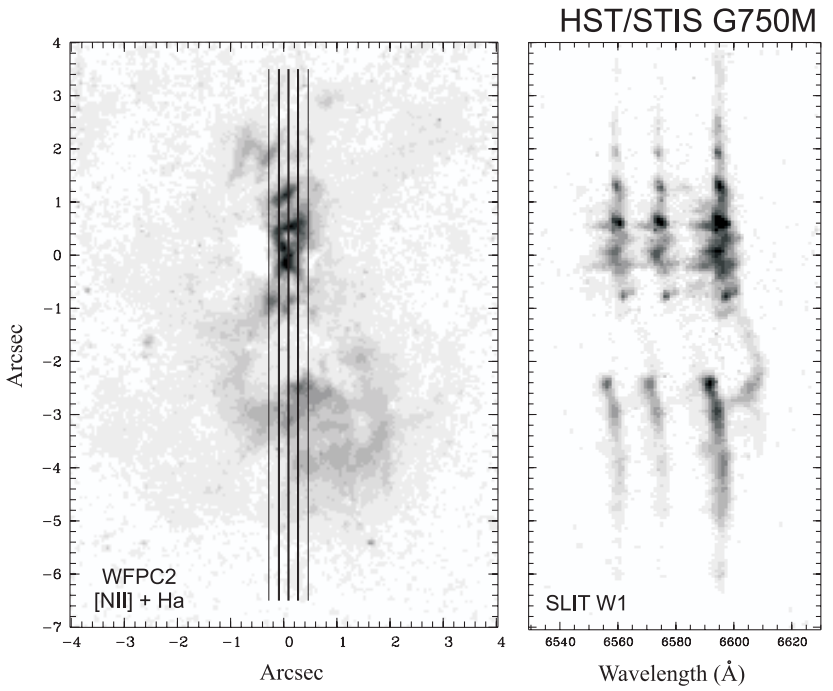

Figure 1. Left panel: WFPC2 [N II]+Hα image of M 51 with the 4 STIS slit positions overplotted. **Right panel:** Zoom over the [N II]+Hα region of one G750M spectrogram.

2. Observations and preliminary results

Figure 1 shows the HST/WFPC2 [N II]+Hα map of the central regions of M 51. In the G750M spectrogram to the right, we have zoomed on the [N II] and Hα complex of lines to outline the various kinematical components detected in the vicinity of the XNC. First, we observe a red component in the "hollow" regions of the bubble. Its velocity increases as we go south and reaches a maximum before decreasing sharply. This behavior is consistent with this component beeing emitted by the back surface of the bubble. As we reach the southern wall of the XNC, we detect a compact blue component associated with a bright [O III] knot (Bradley et al. 2004). As we continue south, an extended third component, with velocities closer to systemic, is detected. It is associated with the diffuse emission seen south of the XNC in the WFPC2 image. On-going, multi-Gaussian fitting of the emission-lines will allow us to study the detailed kinematics of each of these components.

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