

3 μM SPECTROSCOPY OF GALACTIC NUCLEI

M. IMANISHI, H. TERADA, M. GOTO, AND T. MAIHARA
*Department of Physics, Kyoto University, Kitashirakawa,
Kyoto, 606-01, Japan*

1. Introduction

We have carried out spectroscopic observations at 3 μm , where extinction is small, of active galaxies to study the obscured emitting regions with LEWIS (Imanishi et al. 1996) mounted on the Steward Observatory 60 and 61 inch telescopes.

2. Objects

2.1. NGC 1068

The obtained spectrum is shown in Figure 1(a). We found the followings.

- We detected the 3.4 μm carbonaceous absorption feature clearly, which implies that we can view through the obscuring torus at 3 μm .
- By comparing this result with the hard X-ray data, we concluded that the materials in the obscuring torus are concentrated to a thin equatorial plane, and we view the obscuring torus from edge-on direction.
- We did not detect the 3.3 μm emission feature, which implies that the starburst activity just outside of the obscuring torus (hereafter we call nuclear SB activity) is absent.

2.2. NGC 4151

The obtained spectrum is shown in Figure 1(b). We found the followings.

- We did not detect the 3.4 μm carbonaceous absorption feature.
- We did not detect the 3.3 μm emission feature, which implies that the nuclear SB activity is absent.
- We detected a broad (FWHM \sim 2700km/s) Br α line, whose luminosity relative to the hard X-ray luminosity is consistent to other AGNs.

2.3. MRK 231

The obtained spectrum is shown in Figure 1(c). We found the followings.

- The optical depth of the $3.4\mu\text{m}$ carbonaceous absorption feature is smaller than that expected from the $9.7\mu\text{m}$ silicate absorption feature, which can be explained reasonably by the fact that Mrk 231 undergoes ongoing SB activity, and, thus, the abundance of C relative to Si, O, Mg is smaller than that in Our Galaxy.
- We detected broad (FWHM $\sim 1400\text{km/s}$) $\text{P}\gamma$ emission line. The observed hard X-ray luminosity of Mrk 231 is by more than one order of magnitude smaller than that expected from the $\text{P}\gamma$ luminosity.

For more details, please refer to Imanishi et al. (1997a, 1997b)

References

Imanishi et al. 1996, PASP, 108, 1129
 Imanishi et al. 1997a, PASJ, 49, 69
 Imanishi et al. 1997b, in preparation

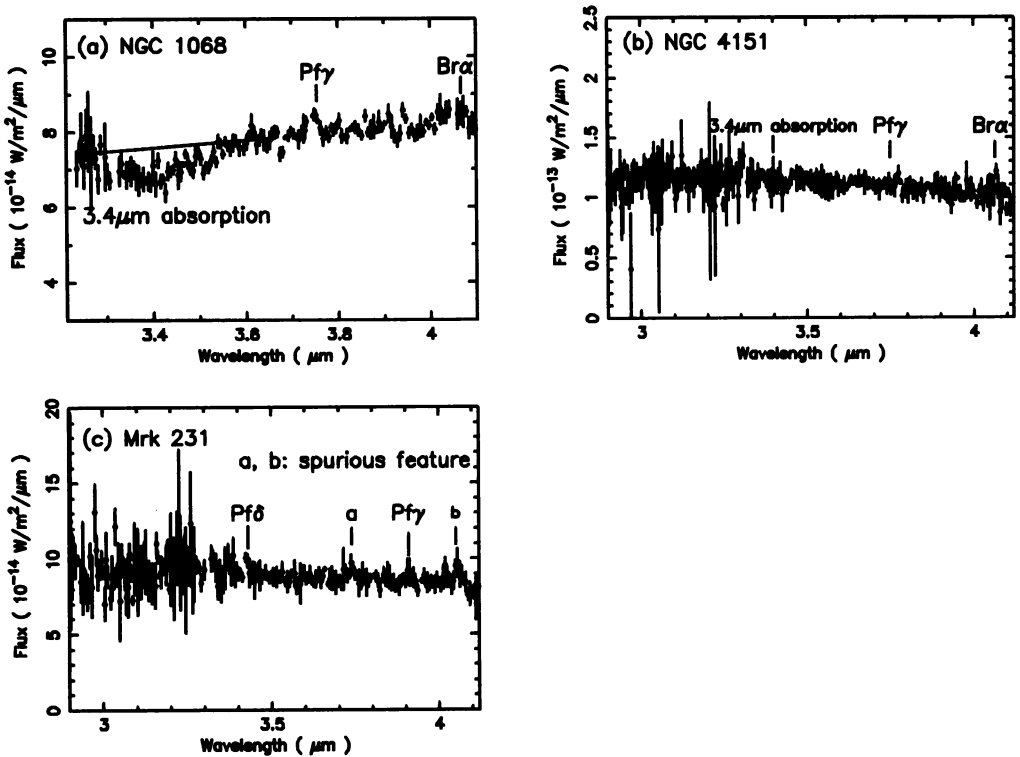


Figure 1. Obtained spectra of (a): NGC 1068, (b): NGC 4151, and (c): Mrk 231.