MICROLENS MAPPING OF DISKS IN ACTIVE GALACTIC NUCLEI

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1. Introduction

Generally, it is believed that there is a supermassive black hole and a surrounding accretion disk in a central region of active galactic nuclei (AGN). However, it is quite difficult to obtain direct information about the center of AGN, because the accretion disk size is far too small to resolve.

Here, we may use a microlens as a 'gravitational telescope' to resolve the disk structure(e.g., Wambsganss & Paczyński 1991). We will then be able to obtain the information about emission propaties in the real vicinity of a putative black hole.

2. Simulations

We adopt two disk models: the geometrically-thin and optically-thick standard disk (Shakura & Sunyaev 1973), and the optically thin version of the advection dominated accretion flow (ADAF, e.g., Manmoto, Mineshige

Y. Sofue (ed.), The Central Regions of the Galaxy and Galaxies, 75-76.

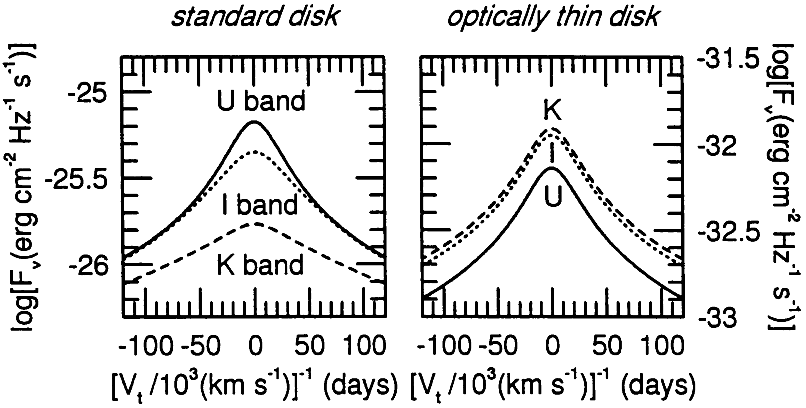

Figure 1. Light curves of the microlensing.

& Kusunose 1997). The letter is significantly hotter ($T \geq 10^9$K), thereby emitting X-rays, while the former predominantly produces optical to UV fluxes.

For clarity, we consider the case that a single lens star passes in front of a quasar, Q 2237+0305: the Einstein cross (Huchra *et al.* 1985). In this object, actually microlens events have been observed several times in the past.

We now continuously change the angular separation between the center of the accretion disk and the lens star, and calculate the microlensing light curve. Figure 1 shows the microlensing light curves of two disks for the case with the impact parameter is 0.01×(Einstein radius) and the lens mass is $1.0M_\odot$. Using the microlensing events, we can distinguish the different structure of AGN accretion disks and map them in details. The details are presented elsewhere (Yonehara *et al.* 1997).

References

Huchra, J., Gorenstein, M., Horine, E., Kent, S., Perley, R., Shapiro, I. I., & Smith, G. (1985), *AJ*, **90. 691**

Manmoto, T., Mineshige, S., & Kusunose, M. (1997), accepted to *ApJ*

Shakura, N.I., & Sunyaev, R.A. (1973), *A&A*, **24. 337**

Wambsganss, J., & Paczyński, B. (1991), *AJ*, **102. 864**

Yonehara, A., Mineshige, S., Fukue, J., Umemura, M., & Turner, E.L. (1997), submitted to *ApJ*

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