TESTING THE CENTRAL ENGINES IN AGNS

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1. Theoretical Predictions

It is very important to estimate the relationship between the central black-hole mass $M_{\rm BH}$ and bolometric luminosity $L_{\rm bol}$ of AGNs, because such a relation may be useful to judge the validity of various models for AGNs (Koratkar & Gaskell 1991, hereafter KG91). The predictions of various models are summerized in Table 1, where B is the magnetic field around the central object.

TABLE 1. The model dependence of $M_{\rm BH}$ - $L_{\rm bol}$ relationship

Model	$M_{\rm BH} - L_{\rm bol}$ relationship	Reference
Radiation-driven jet model	$L_{\rm bol} \propto M_{\rm BH}$	Jaroszyński et al. 1980
Accretion-driven jet model	$L_{\rm bol} \approx$ independent of $M_{\rm BH}$	Pringle 1981, Kaburaki 1986
Spinning black-hole model	$L_{\rm bol} \propto B^2 M_{\rm BH}^2$	Blandford & Znajek 1977
Grazer model	$L_{\rm bol} \propto B^2 M_{\rm BH}^2$	Kaburaki & Taniguchi 1996 Taniguchi & Kaburaki 1996

2. Data

Using the data obtained by Kaspi et al., we have newly derived the masses ($M_{\rm BH}$) of central objects, PG0804+761 and PG0953+414 according to the method used in KG91. Adding these results to the 10 data of KG91 and omitting, instead, 5 original data points with very large errors, we obtain the mass-luminosity relation for AGNs. We find that $L_{\rm bol}$ is proportional to $M_{\rm BH}^2$ rather than to $M_{\rm BH}^1$ (figure1).

K. Koyama et al. (eds.), The Hot Universe, 453-454.

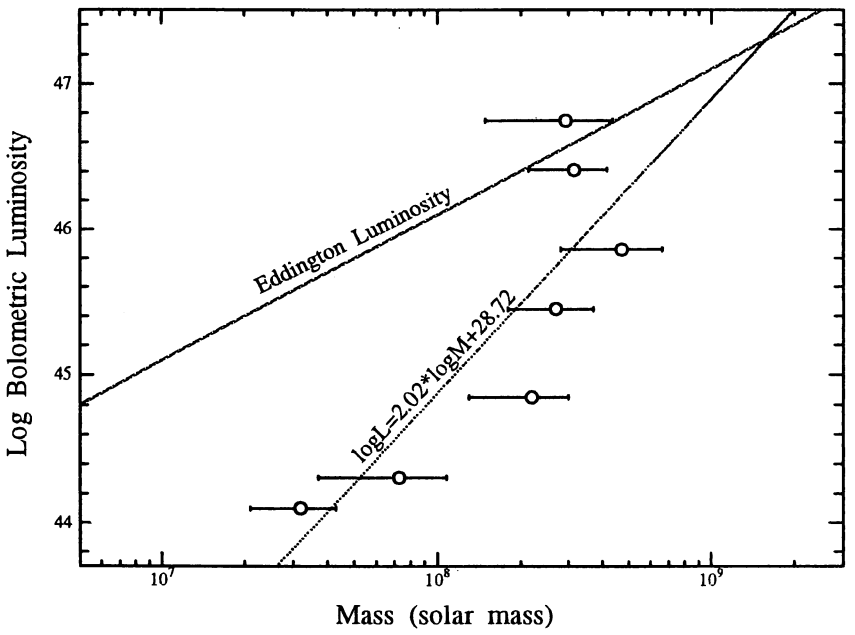

Figure 1. The relation between $M_{\rm BH}$ and $L_{\rm bol}$

3. Conclusion

Our tentative conclusion is that the most appropriate models of AGN engines are the spinning black hole model and the grazer model (Yamazaki et al. 1997). Radiation-driven jet model is not so appropriate but can not be rejected. The normal accretion-driven jet model is inappropriate.

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