Structure Of Outer Regions Of Accretion Disks In AGN
Non irradiated, vertically averaged accretion disks

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DESCRIPTION OF THE MODEL

Radial structure of outer regions of α-disks (Shakura & Sunyaev 1973) is investigated in a more sophisticated way than in Collin-Souffrin & Dumont (1990). The vertically averaged equations for the disk structure hold but some of them are reconsidered : the equation of state (atoms, ions and molecules) with a the rigorous treatment of opacities is introduced. The radiative flux is treated as in Hubeny (1990), and finally a rigourous treatment of the self-gravitaty is included.

We have studied the influence of $(M, \dot{M}, \alpha)$ on the global structure, the influence of self-gravity, and the effect of neglecting some opacity sources. Here are the results for the temperature T and the half-thickness H for a "canonical" model (appliable to NGC 5548 for instance) : $M = 5 \ 10^7 \ M_\odot$, $L = 1/30 L_{Edd}$ ($\approx 0.04 M_\odot/\text{yr}$) and $\alpha = 1$.
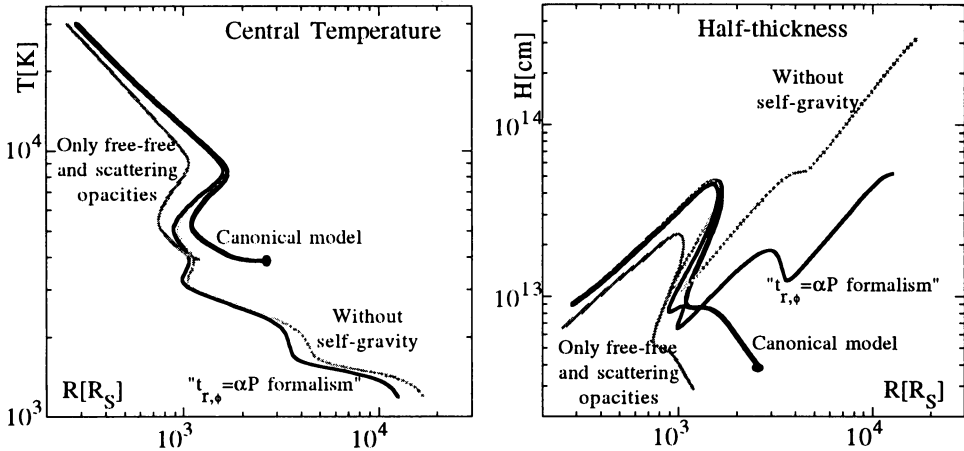
MAIN CONCLUSIONS

Hydrostatic equilibrium cannot be maintained if the gas is too cool to support its own gravity ($\Rightarrow T/\mu|_{min.} \approx m_H/k \left(2G\dot{M}/3\alpha\right)^{2/3}$). The "$t_{r,\phi} = \alpha P$" formalism is not consistent with the equations that include self-gravity. Finally, the opacity is dominated by atomic bound-free and molecular absorption.

Preliminary results on irradiated disks show that the self-graviting dominated region is pushed further away, at $R \approx 10^4 R_S$.

REFERENCES

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