BULGARIAN ACADEMY OF SCIENCES
SPACE RESEARCH AND TECHNOLOGY INSTITUTE
Acad. G. Bonchev Str., Bl. 1, 1113 Sofia, Bulgaria; tel.: +359 2 988 35 03, fax: +359 2 986 16 83; e-mail: office@space.bas.bg, http://www.space.bas.bg

THE ACCRETION DISK IN THE GALACTIC NUCLEI

Krasimira Dimitrova Yankova
Space Research and Technology Institute – BAS
Space-Astrophysics Department
E-mail: f7@space.bas.bg

Abstract

In this paper we consider the magneto-hydrodynamics of the disk in the quasars. Our attention is especially focused to MHD in the system 'disk – corona' around the central black hole. We will analyze the restructuring in the disk stream under conditions of relativistic advection. We will discuss emerging connections on the disk to the other components of quasar.

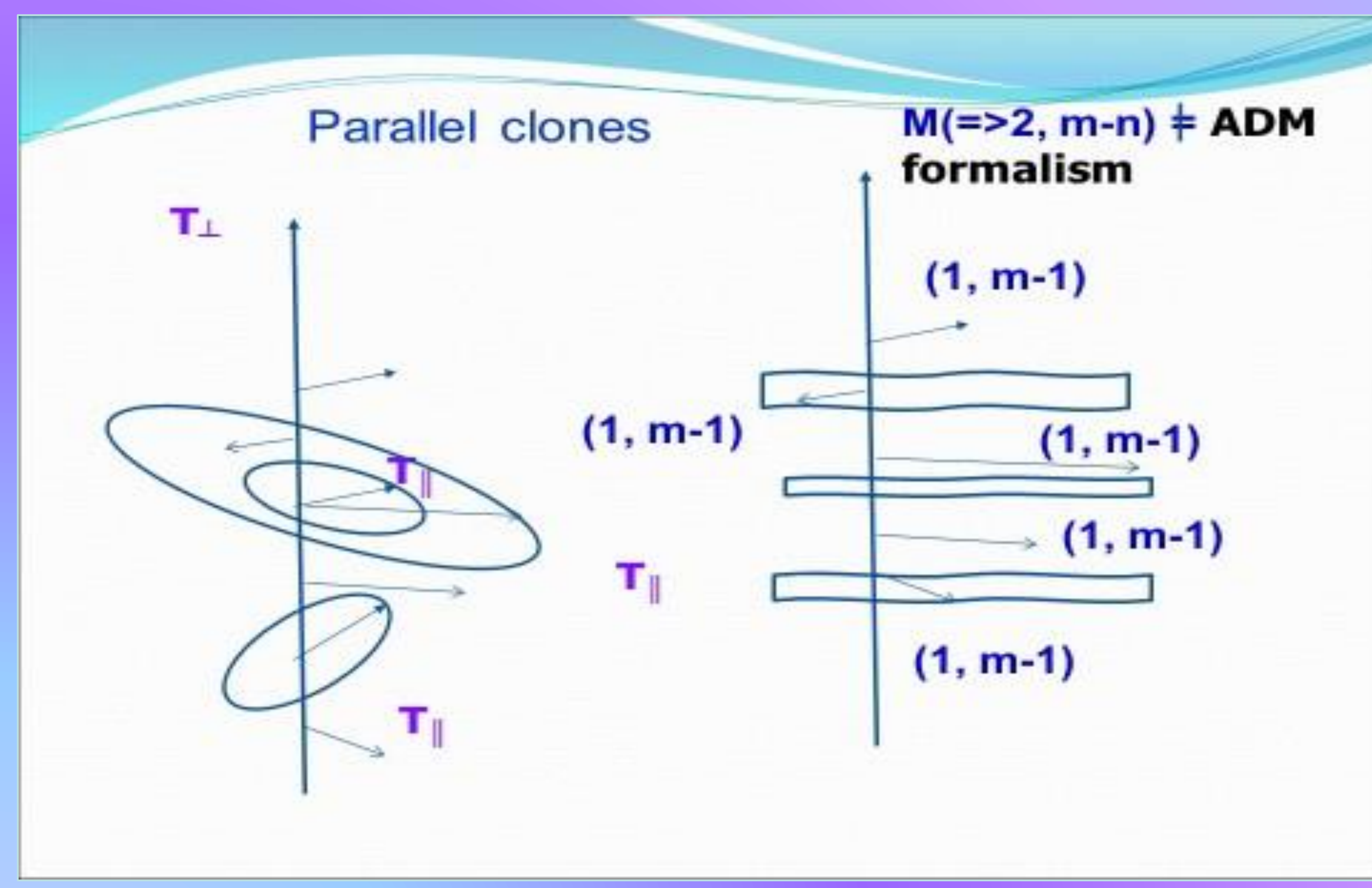
Advective mechanism in M(n, m-n)

$$\left(\partial_{t_i} + \mathbf{v}_{ij}\partial_{x_j}\right) v_{ji} \quad , \qquad \text{where} \quad v_{ij} = \frac{\partial \chi_i}{\partial t_j}$$

and N(n,0)

$$\left(\partial_{t_i} + \mathbf{v}_{ij}\partial_{x_j}\right) v_{ji} = \beta_{ji}\partial_{t_i} + \delta_{ij}\partial_{t_j}$$

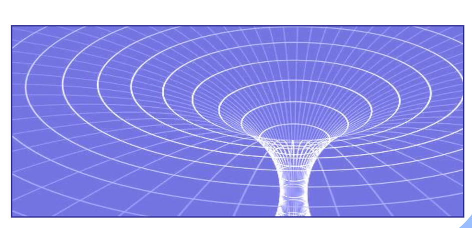
time shifting is a real part of the advective operator



Contribution of the new dimensions in the full and in the background metrics

$$\begin{pmatrix} g_{0\|} & 0 & g_{\|r} & g_{\|\varphi} & 0 \\ 0 & g_{0\perp} & g_{\perp r} & g_{\perp\varphi} & g_{\perp\theta} \\ g_{\|r} & g_{\perp r} & g_{rr} & 0 & 0 \\ g_{\|\varphi} & g_{\perp\varphi} & 0 & g_{\varphi\varphi} & 0 \\ 0 & g_{\perp\theta} & 0 & 0 & g_{\theta\theta} \end{pmatrix} \Rightarrow\Rightarrow\Rightarrow \begin{pmatrix} g_{0\|} & 0 & g_{\|r} & g_{\|\varphi} & 0 \\ 0 & g_{0\perp} & g_{\perp r} & 0 & 0 \\ g_{\|r} & g_{\perp r} & 1 & 0 & 0 \\ g_{\|\varphi} & 0 & 0 & g_{\varphi\varphi} & 0 \\ 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

$$\left(g_{t_\| r}\dot{t}_\| + g_{t_\perp r}\dot{t}_\perp + g_{rr}\dot{r}\right)\dot{r} = \frac{V(r)}{2}$$



$$\Omega = -\frac{(\varepsilon - V(r))g_{t\varphi} + \left(g_{tt} + g_{tr}\dot{r}\right)l}{\varepsilon\, g_{\varphi\varphi}}$$

Contribution of the magnetic field

Connections direct and feedback

- ***Self-gravity and background potentials determined by space-time metrics are directly related to the evolving advection, because as a full differential, it must accurately follow the metrics of diversity.***
- ***Topology magnetic field determine the feedback connections of fundamental advection***

Sign of the entropy

- ***Gradient of entropy determined the general direction of the time in manifold τ***

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The interesting thing in the case of disk accretion is that advection manages to force more photons to move in orbits for massive particles because they cannot leave the mainstream due to high flow density

('*')Then the stress tensor for massive and non-massive particles is collective (it looks the same way and is a simple superposition the stress tensors), only whit small correction, to the leaving photons. This also applies to sum self-gravity flow

$$\rho_{eq} = \rho_{mater} + \rho_{rad}$$

Central object - Kerr–Newman black hole or modification of the Kerr-Newman BH in more dimensions

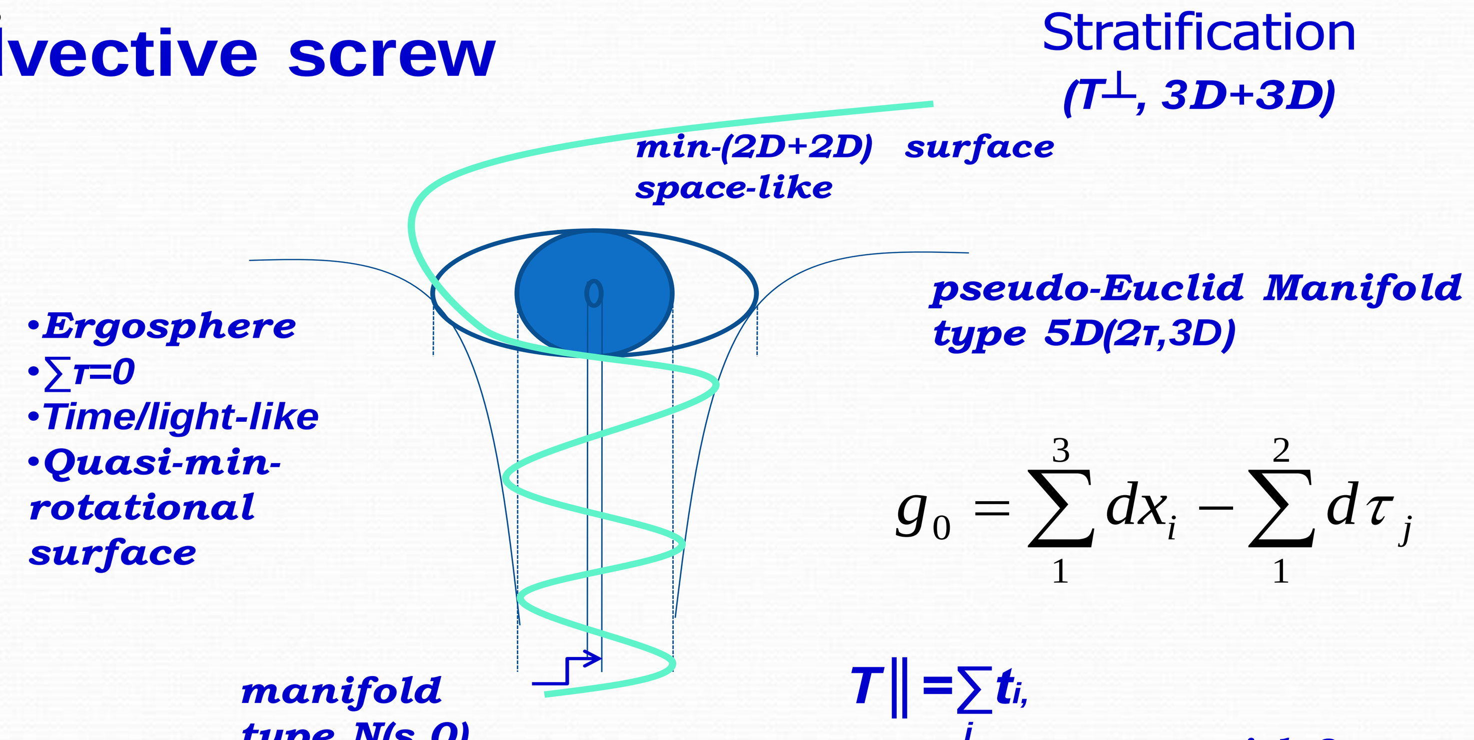
$$ds^2 = g_{tt}dt_\|^{\,2} + g_{tt}dt_\perp^{\,2} + 2g_{tr}dt_\| dr + 2g_{tr}dt_\perp dr + 2g_{t\theta}dt_\perp d\theta + \\ + 2g_{t\varphi}dt_\| d\varphi + 2g_{t\varphi}dt_\perp d\varphi + +g_{\varphi\varphi}d\varphi^2 + g_{rr}dr^2 + g_{\theta\theta}d\theta^2$$

Model accretion flow:

$$ds^2 = g_{tt}dt^2 + 2g_{t\varphi}dtd\varphi + g_{\varphi\varphi}d\varphi^2 + g_{rr}dr^2 + dz^2$$

Advective Spirals in GR

Advective screw



$$g_0 = \sum_1^3 dx_i - \sum_1^2 d\tau_j$$

$$T\| = \sum_i t_i, \qquad T\perp = \sum_j t_j; \qquad j = k-3$$

$$\dot{z} = const$$

$$\dot{t} = \frac{\left[\Delta + q\left(a^2 + r^2\right)\right]\varepsilon - aql}{\left[\Delta + q\left(a^2 + r^2\right)\right]^2 + aq(q-1)}$$

$$\dot{\varphi} = \frac{aq\varepsilon - (q-1)l}{\left[\Delta + q\left(a^2 + r^2\right)\right]^2 + aq(q-1)}$$

$$\dot{r} = \pm\frac{g_{t\varphi}\varepsilon + g_{tt}l}{g_{\varphi\varphi}\varepsilon + g_{t\varphi}l}\sqrt{r^2/g_{rr}} = \pm\frac{-aq\varepsilon + (q-1)l}{\left[\Delta + q\left(a^2 + r^2\right)\right]\varepsilon - aql}\sqrt{\Delta}$$