DEFORMATIONLESS ADVECTION

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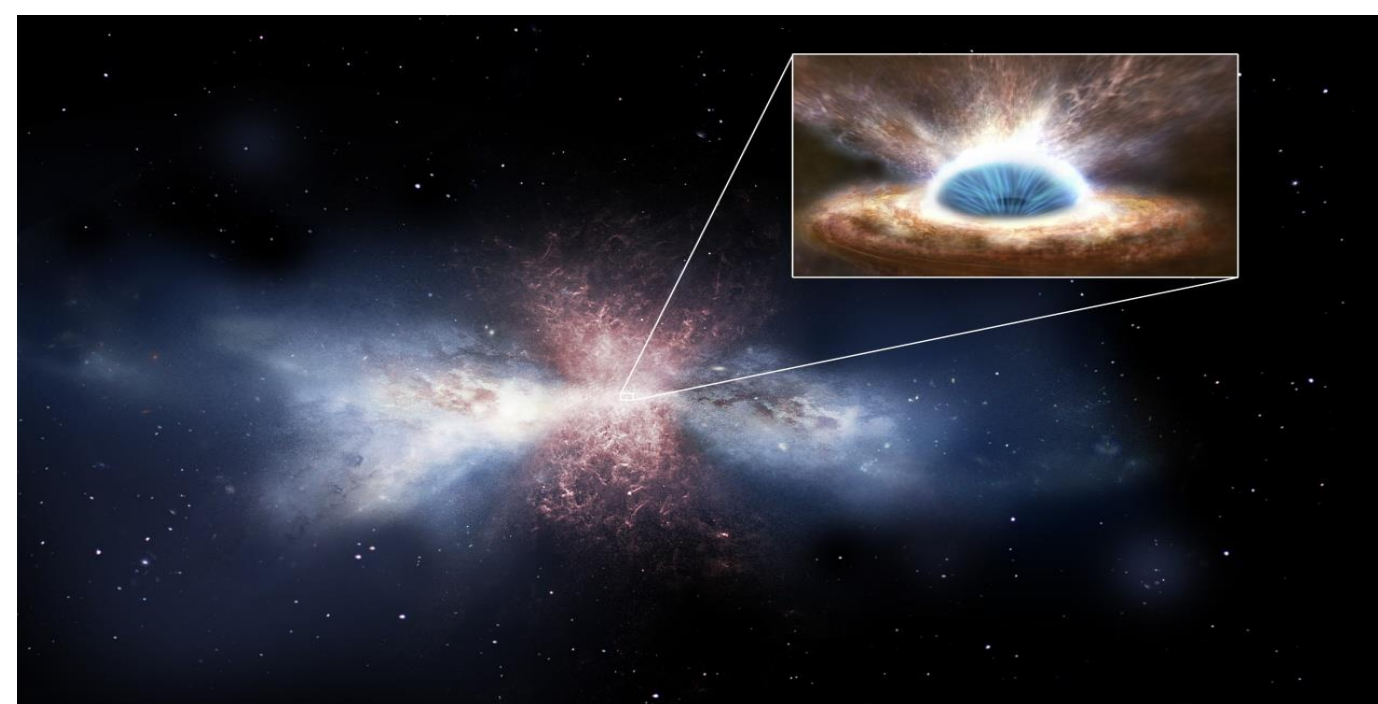*Space-Astrophysics Department*

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Abstract

In this paper consider the magneto-hydrodynamics (MHD) on the system 'disk – corona' around the central black hole. Is analyzes the impact of the restructuring in the stream, over self-induction of the advection and exchange of energy. Shows post-Newtonian develop of the advective mechanism and approach to the upgrade of the model in GR. We will discuss behaviour on the emerging connections on the disk to the other components of quasars.

Deformationless advection

$$\frac{\partial(\rho v_i)}{\partial t} + \frac{\partial}{\partial x_j}(\rho v_i v_j) = \rho\left(\frac{\partial v_i}{\partial t} + v_j\frac{\partial v_i}{\partial x_j}\right) = \rho\frac{Dv_i}{Dt}$$
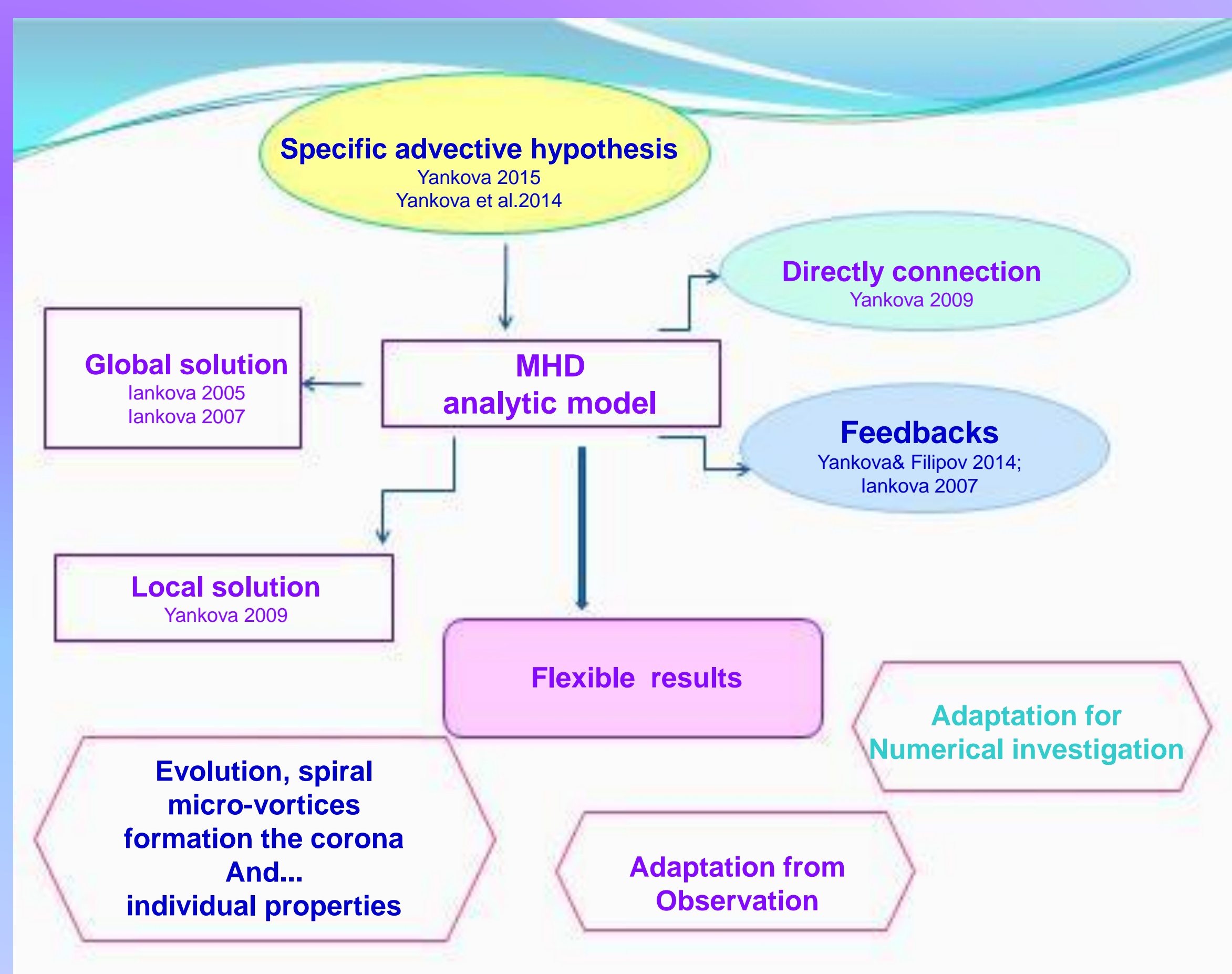
In the presented new interpretation

Yankova Kr.D.: 2013, Yankova Kr.: 2015, https://www.scopus.com/authid/detail.uri?authorId=56206009300

of physics at the left side of the equation for the motion: complete advective term is a complete differential: This means that arises a shifting of the average flow with velocity vi in any direction- doesn't indicate the individual modification of one or other of the velocity components; and full advective term transfers the solution as a whole, without ignored the action of $\partial v_i/\partial t$.

Specific advective hypothesis
Yankova 2015
Yankova et al.2014

Directly connection Yankova 2009

Global solution Iankova 2005 Iankova 2007

MHD analytic model

Feedbacks Yankova& Filipov 2014; Iankova 2007

Local solution Yankova 2009

Flexible results

Adaptation for Numerical investigation

Evolution, spiral micro-vortices formation the corona And... individual properties

Adaptation from Observation

Contribution of the magnetic field

Connections direct and feedback

- *Determine the direction of the disc's middle flow displacement.*

- *It gives additional dissipative mechanism which directly affects the development of the gradient of entropy in the disc.*

- *Prevents transition to the dominant regime*

Sign of the entropy

Negative gradient of entropy $\partial_t S$ determined the basic criterion for development and the self-induction on the advection.

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*

Wilson error

$$\left(\partial_t + v_j\partial_{x_j}\right)v_i \Rightarrow \partial_t v + v\nabla v =$$

$$\Rightarrow \partial_t v + \frac{1}{2}\nabla(v)^2$$

again ignores the time components

$$\Rightarrow \partial_{t_i} \equiv 0$$

and presents pure spatial advection

Advective mechanism in M(n, m-n)

$$\left(\partial_{t_i} + \boldsymbol{v}_{ij}\partial_{x_j}\right)v_{ji} \quad ,$$

where $\quad v_{ij} = \dfrac{\partial x_i}{\partial t_j}$

and N(n,0)

$$\left(\partial_{t_i} + \boldsymbol{v}_{ij}\partial_{x_j}\right)v_{ji} = \left(\partial_{t_i} + \boldsymbol{v}_{ij}[\nabla_x \equiv 0]\right)v_{ji} = \beta\partial_{t_j}$$

time shifting is a real part of the advective operator

Stratification

- *number of dimensions*
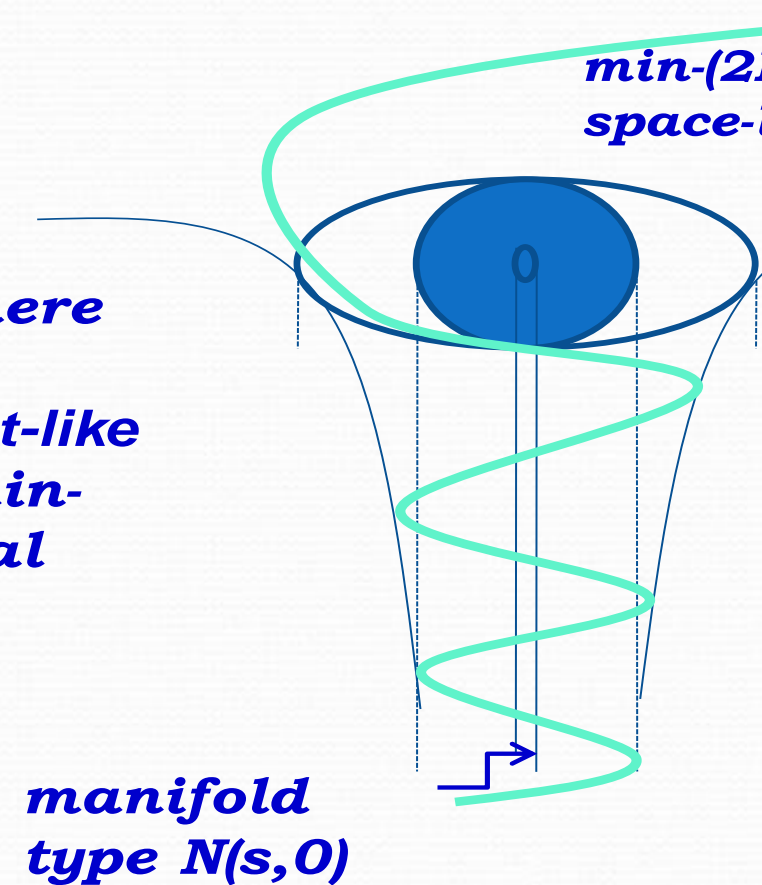- *quantum cloning*
- *spatial density*
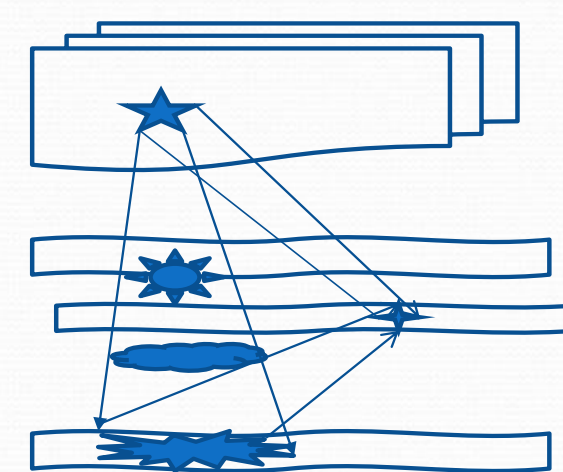
$$\frac{D}{D\tau}\begin{pmatrix} v \\ B \\ S \end{pmatrix}$$

$$T_{\mu\nu} = \begin{pmatrix} T_{00} & T_{0i} \\ T_{i0} & T_{ij} \end{pmatrix} = \begin{pmatrix} ed & md \\ efd & mfd \end{pmatrix}$$

Advective mechanism in GR

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

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

Model accretion flow

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

Future

The aim is a summary of the developed analytical model for the structuring of disk components of AGNs in GR.

In our future research will be seeking answers to the following problems:
1. To identify in what way the development of non-deformable/ deformationless advection in general relativity, validation it as a fundamental mechanism;
2. To determine and displayed the nature of causal connection which provides a non-thermal control on the advection mechanism;
3. To obtain estimates of the degree of unification of the model due to the operation of the mechanism.

Advective Spirals in GR

Advective screw

Stratification (T⊥, 3D+3D)

min-(2D+2D) surface space-like

pseudo-Euclid Manifold type 5D(2τ,3D)

- *Ergosphere*
- *∑τ=0*
- *Time/light-like*
- *Quasi-min-rotational surface*

manifold type N(s,0)

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

$$T\| = \sum_i t_i,$$

$$T\perp = \sum_j t_j;$$

$$j=k-3$$

Advective Spirals in GR

Advective ring and

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

Advective screw

$$ds^2 = g_{tt}dt_{\parallel}^2 + g_{tt}dt_{\perp}^2 + 2g_{tr}dt_{\perp}dr + 2g_{tr}dt_{\parallel}dr + 2g_{t\varphi}dt_{\parallel}d\varphi + g_{\varphi\varphi}d\varphi^2 + dr^2 + dz^2$$