

Seminar "Geometry&Physics" @ DFT (IFIN-HH)  
([Geometry&Physics Homepage](#))

*Seminar organizer:* Mirela Babalic (IFIN-HH)

Zoom link: <https://us06web.zoom.us/j/85655094155>

*Date:* Wednesday, November 17, 2021, 15:00 Bucharest time

*Title:* **Primordial Black Holes form Rapid Turns in Two-field Models**

*Speaker:* **Lilia Anguelova** (INRNE, Sofia)

*Abstract:* Primordial Black Holes (PBH), which are thought to form from large fluctuations in the Early Universe, are a natural candidate for dark matter. However, in the standard single-field inflationary models their generation is a challenge. We show that PBHs can form in a type of two-field models with hyperbolic scalar-field manifold. More specifically, we investigate a class of exact solutions of the background equations of motion, which possess a certain hidden symmetry, and show that their trajectories in field space exhibit a brief sharp turn. The latter induces a transient tachyonic instability of a particular scalar perturbation, which triggers the formation of PBHs. Furthermore, we find new non-symmetric solutions, which preserve the PBH-generating property of the hidden symmetry ones while having a better behaved Hubble eta-parameter. Finally, we show that these modified solutions represent transitions between two known inflationary phases, namely ultra-slow roll and slow roll. It is notable that, unlike in the typical hyperbolic models (alpha-attractors) which require very large (compared to the Planck scale) field values, in our models the phenomenologically-relevant part of field space is at (very) small field values.