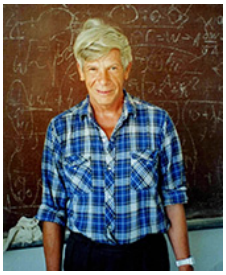

Contribution ID: **111** Type: **Plenary Talk**

# Dark matter with nontrivial motion as a gravitational effect of modified theories of gravity

*Thursday 13 October 2022 12:00 (45 minutes)*

The mystery of the nature of dark matter is one of the most interesting problems of modern theoretical physics. The lack of progress in attempts to directly detect dark matter allows us to assume that all effects related to dark matter are purely gravitational. The key idea of such an approach is to switch from GR to some modified theory of gravity with more general equations than the Einstein equations. If new equations can be written as Einstein equations with an additional contribution in the r.h.s., then some of the degrees of freedom of the modified gravity appear to be responsible for dark matter which turns out to be fictitious. The comparison of the properties of this fictitious matter arising in considered modified gravity with the observable properties of dark matter gives the opportunity to verify the theory. The most known example of such modified gravity is the mimetic gravity. However, the mimetic gravity in its simplest form leads to fictitious matter with a too small number of degrees of freedom. In order to describe all observable properties of dark matter the mimetic gravity should be significantly complexified by introducing additional parameters and terms into the action of the theory. Another example of an appropriate modified theory of gravity is Regge-Teitelboim's embedding theory giving essentially nontrivial fictitious matter right away. On the other hand, the description of gravity in terms of embedding theory has a clear geometric sense closely related to the one utilized in the fundamentals of the string theory. The key idea of the embedding approach is to suggest that the time-space is a curved 4-dimensional surface in a flat 10-dimensional ambient space. Since the usual Einstein-Hilbert action is used the embedding gravity doesn't contain any additional parameters. The properties of the fictitious matter in this approach can be compared with the observed properties of dark matter on the cosmological and galactic scales as well. For the convenience of comparison, one can reformulate the embedding gravity in a form of GR with additional contributions at the level of choice of action and degrees of freedom. Also, a method can be proposed to analytically estimate the possibility of core or cusp density profile origin in galaxies in order to gather more precise information about dark matter behavior.

**Author:** PASTON, Sergey (St.Petersburg State University)

**Presenter:** PASTON, Sergey (St.Petersburg State University)

**Session Classification:** Plenary Session