Contribution ID : **429** Type : **Oral talk**

Dark Energy models

Friday, 30 October 2026 13:05 (15)

Matter consists of particles and fields, and more consistently only of quantum fields. Particles are the localized excitations of quantum fields. Sometimes fermions are called matter'' and bosons are calledfields''. Definition: the component of the Universe is called "dark'' if it does not emit the light.

{\bf Basic components of observable Universe}:

70\% is the dark field' orDark Energy' (DE), which is the dominating component of the Universe in the modern Standard Astrophysical Model (named also the Cosmology of High Accuracy). Dark Energy is either filling up all Universe with negative pressure, p<0, or it may the mean value of all quantum fields, i.e. the cosmological constant Λ.

25\% is the dark particles' orDark Matter', which is the component of the Universe with zero pressure, $p = 0$. The physical origin of Dark Matter is unknown.

5\% is the Visible Matter, which is only a small fraction of our Universe, consisting mainly from baryons in stars, planets and in the interstellar gas.

It is usually the Einstein's General Relativity is used in numerical simulations, but the General Relativity itself is not verified in cosmology!

%The composition of the major parts of our Universe ($> 95\%$) is unknown!

The incomplete and replenished list of Dark Energy models:

General Relativity framework: quintessence DE, k-essence DE, Born-Infeld DE; BKS condensate DE, ghost-condensate DE, et al.

General Relativity modifications: $f(R)$ gravity DE, Gauss-Bonnet DE, holographic gravity, super-string gravity, quantum-entangled gravity et al.

%The term Dark Energy'' is ungrammatical. There must be some carrier for energy. The energy itself can not bedark'' or bright''. It is more reasonable to say on thedark field'' or invisible field''. Meanwhile, the termDark Energy'' becomes conventional and accepted by scientific community.

Interpretation of the experiment is impossible without theoretical models, ideas and concepts. The problem of "Dark Energy'' is the interrelation between the experiment and the theory!

Theoretical modeling is based on: (1) Scientific method: experiment as criterion of truthfulness (Francis Bacon and Karl Popper); (2) criterion of beauty: the theory must be beautiful (Occam's razor); (3) Criterion of novelty: the theory must be novel and must provides new effects and phenomena; (4) criterium of liberty: all is allowed, if not forbidden.

{\bf After all, what is Dark Energy? We don't know!}

Primary author(s) : DOKUCHAEV, Vyacheslav (Institute for Nuclear Research of the Russian Academy of Sciences)

Presenter(s) : DOKUCHAEV, Vyacheslav (Institute for Nuclear Research of the Russian Academy of Sciences)

Session Classification : Gravitation and cosmology

Track Classification : Gravitation and cosmology