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Registration of gravitational waves – a triumph of the general theory of relativity

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The general key ideas leading to the creation of the general theory of relativity and prediction of gravitational waves are considered in the paper. Material is presented using a historiographical method which allows tracing the origination and further movement of the concepts that became kinematic and dynamic innovations in theoretical physics. The main objective pursued by authors is to develop an algorithm of actions for teachers for familiarizing of interested students of non-physical areas with scientific content of the general theory of relativity. First issue under discussion: was Albert Einstein satisfied with the degree of SR generality? And consequence-introduction to the construction of the general theory of relativity of the equivalence principle. Implementation of the equivalence principle can be a sequence of mathematically expressed steps: local Lorentz invariance → gauge principle → general covariance. Next step is the Riemann tensor and the tensor of energy–momentum. Particular attention should be paid to the phenomena of gravitation which are described by two parts of the Riemann tensor: Einstein tensor and Weyl tensor. Further, Zeldovich's ideas about the existence of a gravitational vacuum subsystem: the Einstein gravity theory permits existence of empty flat Minkowski space under the condition that the gravitational vacuum energy completely balances the energy of vacuum non-gravitational physical fields. It is possible, that dark energy in the modern Universe is the balanced vacuum. There is hope that the study of gravitational waves will answer the question on the vacuum as the source of abstraction of our world.

Biography

Minasyan Larisa Artavadzovna in 1993 defended her Doctoral thesis at the Moscow Pedagogical State University. She works as a Professor of the Department of Physics of the Don State Technical University (Russia, Rostov-on-Don). She has more than 200 scientific papers. Her research interests is in particle physics and cosmology, history and philosophy of physics. She is a member of the Editorial Board of the journal *Scientific Thought of Caucasus*.

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