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Cosmoparticle physics - the science on cosmology and its particle physics basis

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The modern cosmology is based on inflationary model with baryosynthesis, dark matter and dark energy. These phenomena imply the predictions of particle theory, going far beyond the experimentally proven Standard model of elementary particles and involving new symmetries, particles and fields at various new fundamental scales. On the other hand cosmological probes become a necessary element of modern high energy physics. That fundamental relationship of micro- and macro- worlds implies complex cross-disciplinary studies of the combination of indirect physical, astrophysical and cosmological signatures of physics beyond the Standard model, on which modern cosmology is based. Cosmological impact plays special role in these studies, revealing the nontrivial relationship of cosmological structures and dark matter candidates with new symmetries beyond the Standard model and mechanisms of their breaking. Symmetry can be restored in early Universe and phase transitions related with its breaking can lead to macroscopical primordial nonlinear structures, like clouds of massive primordial black holes, whose coalescence might have been observed in gravitational wave detectors.