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Inflation and primordial black hole production in Starobinsky-like supergravity

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A viable model of large-field (chaotic) inflation with efficient production of primordial black holes is proposed in Starobinsky-like (modified) supergravity leading to the "no-scale-type"Kähler potential and the Wess-Zumino-type ("renormalizable") superpotential. The cosmological tilts are in good (within 1σ) agreement with Planck measurements of the cosmic microwave background radiation. In addition, the power spectrum of scalar perturbations has a large peak at smaller scales, which leads to a production of primordial black holes from gravitational collapse of large perturbations with the masses about 10^{17}g. The masses are beyond the Hawking (black hole) evaporation limit of 10^{15}g, so that those primordial black holes may be viewed as viable candidates for a significant part or the whole of the current dark matter. The parameters of the superpotential were fine-tuned for those purposes, while the cubic term in the superpotential is essential whereas the quadratic term should vanish. The vacuum after inflation (relevant to reheating) is Minkowskian. The energy density fraction of the gravitational waves induced by the production of primordial black holes and their frequency were also calculated in the second order with respect to perturbations.

Primary author: Mr ISHIKAWA, Ryotaro (Tokyo Metropolitan University)

Co-author: Prof. KETOV, Sergei (Tokyo Metropolitan University)

Presenter: Mr ISHIKAWA, Ryotaro (Tokyo Metropolitan University)

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