

novel matter coupling in Einstein gravity

Thursday 14 November 2019 11:00 (1 hour)

The old school knowledge tells us that the matter can couple to Einstein gravity in either minimal or Brans-Dicke manner. Recently we discovered a novel type of matter coupling in Einstein gravity. This type of matter coupling is theoretically self-consistent in the sense that all constraints in the Hamiltonian are preserved to be first class. At low energy scale it recovers the classic standard predictions of Einstein gravity + minimal coupling, including the gravitational potential, equivalence principle and so on, while at the high energy scale much richer phenomenology is granted. We predict a universal lower bound on the cross section between dark matter particle and Standard Model particles in this framework. The novel matter coupling may provide a resolution to the cosmological singularity problem.

Ref: for Hamiltonian analysis, see P. A. M. Dirac, “Lectures on Quantum Mechanics” (Yeshiva University, New York 1964).

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