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# Production Mechanisms of Massive Spin-2 Dark Matter in the Early Universe

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The possibility of additional spin-2 particles beyond the graviton has attracted growing interest in both cosmology and high-energy theory. In particular, massive spin-2 fields, or "dark gravitons", have emerged as compelling dark matter candidates. Such states naturally arise in consistent ghost-free extensions of General Relativity, such as bigravity. The dynamics of these fields are constrained by the requirement of theoretical stability, with the most stringent condition provided by the Higuchi bound, which sets a lower mass limit to avoid negative-norm states. In this seminar, I will review the main mechanisms responsible for the production of spin-2 particles in the early Universe. I will show how, in all the cases, the Higuchi bound significantly restraints the available parameter space for dark gravitons as dark matter. I will then present how the effective mass of the spin-2 field can be dynamically lowered in chameleon-like extensions of bigravity. In the final part of my talk, I will introduce a novel, consistent mechanism to generate massive gravitons with masses in the ultralight regime, within the framework of chameleon bigravity. The aim is to provide a unified overview of production mechanisms and theoretical constraints, highlighting the role of spin-2 states as probes of the early Universe and as candidates for new physics beyond the Standard Model of cosmology.

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