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The quantum-to-classical transition of primordial cosmological perturbations

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There is a widespread belief that the classical small inhomogeneities which gave rise to all structures in the Universe through gravitational instability originated from primordial quantum cosmological fluctuations. However, this transition from quantum to classical fluctuations is plagued with important conceptual issues, most of them related to the application of standard quantum theory to the Universe as a whole. In this paper, we show how these issues can easily be overcome in the framework of the de Broglie-Bohm quantum theory. This theory is an alternative to standard quantum theory that provides an objective description of physical reality, where rather ambiguous notions of measurement or observer play no fundamental role, and which can hence be applied to the Universe as a whole. In addition, it allows for a simple and unambiguous characterization of the classical limit.