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Inflationary scalar field dynamics and the mass spectrum of primordial black holes

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One of the known mechanism for primordial black holes formation is based on the collapse of closed domain walls in the early Universe. The domain walls arise from multiple scalar field fluctuations during the inflationary stage. Two approaches exist for describing this process: the massless field and the massive field approximation. This paper explores both approximations. The mass spectra of the forming primordial black holes are derived and compared for both cases. In addition, the conditions of applicability for each approach are discussed.

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