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The unexpected shape of the primordial black hole mass function

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We show that a broad power spectrum—modeled as a plateau between infrared and ultraviolet scales—results in a bimodal mass function, with the dominant peak corresponding to heavy PBHs associated with the infrared scale.

This result, based on compaction function statistics, significantly impacts overproduction bounds on the power spectrum amplitude, underscores the need for further advancements in PBH formation theory, and tightens the viable mass range for primordial black holes as dark matter.

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