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Calculating the abundance of primordial black holes: complications and opportunities

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With modern and upcoming surveys providing ever tightening constraints, and even potential detections, it is becoming more important than ever to make robust and precise calculations for the abundance of primordial black holes (PBHs). Their abundance depends strongly on the primordial power spectrum, and constraints on the PBH abundance have historically been used to place unique constraints on the power spectrum, although complications such as non-Gaussian distributions and phase transition are often neglected - the effects of which can be degenerate with the effect of the power spectrum. However, by considering other factors, such as the initial clustering mass function, these complications can provide an opportunity to reveal more information about the early universe. In this talk, I will first describe how the abundance and mass function can be calculated, before discussing how phase transitions and non-Gaussianities can leave characteristic signatures in the PBH mass function, abundance and clustering.

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