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Effects of accreting Primordial Black Holes on the CMB

Primordial Black Holes (PBHs) maybe formed in the Early Universe during the so called radiation-dominated era, significantly before the appearance of the first nuclei and the first stars. The interest on this dark matter candidate was renewed after the first binary black hole gravitational gave event detected by the LIGO-Virgo Collaboration. In particular it was proposed that PBHs with masses of order ~10 $M_\odot$ can make up a substantial fraction of the dark matter. There are many constraints that come from the non-detection of radiation produced by the PBH as a result of the gas accretion process.

The goal of this work is to improve the modelling of PBH accretion in order to obtain more robust constraints on PBH abundance. Existing constraints rely on too simplistic accretion models, e.g., spherical accretion, or on extreme assumptions, e.g., large PBH luminosity. In particular, we already have evidence that astrophysical BHs produce outflows (winds and/or jet), which were never considered in the PBH scenario. Recent works have argued that the formation of outflows can be achieved by a variety of mechanisms, i.e., that they are a phenomenon that arises quite naturally. Moreover, once these outflows formed, they can damp the PBH accretion by a factor few up to one order of magnitude due to mechanical feedback they generate. I will provide an improved modelling of PBH accretion which includes also the possible presence of outflows and their impact on the accretion rate and the energy injection in the surrounding medium.

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