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## Gravitational wave signatures from magnetised supermassive primordial black holes

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Primordial black holes (PBH) can account for a wide variety of cosmic conundra, among which the origin of primordial magnetic fields. In this talk, we consider supermassive PBHs furnished with a disk due to the vortexlike motion of the primordial plasma around them at the epoch of their formation, proposing at the end a novel natural ab initio mechanism for the generation of a battery induced seed magnetic field (MF) which can be later amplified by various dynamo/instability processes and provide the seed for the present day MF on intergalactic scales. Then, we derive the gravitational-wave (GW) signal induced by the magnetic anisotropic stress of such a population of magnetised PBHs, checking its detectability by future GW detectors. Finally, by avoiding GW overproduction we set upper bound constraints on the abundances of supermassive PBHs  $\Omega_{\text{PBH}}$  as a function of their mass, which are comparable with constraints on  $\Omega_{\text{PBH}}$  from large-scale structure probes; hence promoting the portal of GWs included by magnetised PBHs as a new probe to explore the enigmatic nature of supermassive PBHs.

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