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Signatures of no-scale supergravity in Nanograv and beyond

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In this talk I am going to present our recent work where we derive for the first time a three-peaked GW signal associated to no-scale Supergravity within the frequency ranges of nHz, Hz and kHz, with the former being in excellent agreement with NANOGrav/PTA GW data. We concentrate on the primordial gravitational wave (GW) spectrum induced due to second-order gravitational interactions by inflationary curvature perturbations as well as by isocurvature energy density perturbations of primordial black holes (PBHs) which are produced naturally within the framework of no-scale Supergravity. In particular, we work within Wess-Zumino type no-scale Supergravity and its naturally realised inflection-point inflationary potentials, which can give rise to the formation of microscopic PBHs which trigger an early matter-dominated era (eMD) and evaporate before Big Bang Nucleosynthesis (BBN). Remarkably, we obtain an abundant production of gravitational waves at three different frequency ranges: 1) a resonantly amplified GW signal in the nHz frequency range induced by enhanced inflationary adiabatic perturbations and in strong agreement with NANOGrav/PTA data 2) a GW spectrum peaked at the Hz frequency range induced by isocurvature PBH fluctuations 3) a GW signal induced by the enhanced primordial curvature power spectrum around the characteristic PBH scale, being within the kHz frequency range and potentially detectable by electromagnetic GW detectors. The simultaneous detection of all three nHz, Hz and kHz GW peaks can constitute a clear indication in favor of no-scale Supergravity.

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