Contribution ID: **24** Type: **not specified**

ΔN_{eff} from SGWB: PTA and CMB

Thursday 25 September 2025 17:24 (18 minutes)

We investigate whether an Early-Universe stochastic gravitational–wave background (SGWB) can account for the common-spectrum process reported by NANOGrav, while also being consistent with current and projected CMB measurements of extra radiation. We compute the contribution of the effective number of relativistic species, ΔN_{eff}, for a number of Early-Universe models proposed to explain the pulsar timing array (PTA) spectrum. We demonstrate that models predicting ΔN_{eff} above the CMB limit would be firmly excluded, implying that the NANOGrav signal in tension with these bounds must instead arise from astrophysical sources. We find that current NANOGrav 15-year dataset, sensitive up to 60 nHz, gives a negligible contribution to ΔN_{eff} and remains well below the present and future CMB detection threshold. However, when we project future PTA capabilities reaching upto 1 μHz, even with our conservative estimate we find that Inflation, Scalar Induced Gravitational Waves (SIGW), and metastable cosmic strings can induce a ΔN_{eff} large enough for $> 3.5\sigma$ detection by the Simons Observatory.

Primary authors: VERMA, Amresh (Ariel University); Dr BEN-DAYAN, Ido (Ariel University); Dr SHIMON, Meir (Tel Aviv University); Dr KUMAR, Utkarsh (Ariel University)

Presenter: VERMA, Amresh (Ariel University)

Session Classification: Parallel Sessions Thursday Cosmo 2

Track Classification: Cosmology & Astroparticle Physics