Contribution ID: **124** Type: **not specified**

Pulsar hints for nanohertz gravitational waves?

Thursday, February 10, 2022 2:00 PM (1h 20m)

All major pulsar timing array (PTA) collaborations—NANOGrav, PPTA, EPTA, and IPTA—are now seeing indications of a new stochastic process in their latest data sets. If confirmed in the future, this new signal may turn out to be the first glimpse of a stochastic gravitational-wave background (GWB) at nanohertz frequencies. In this talk, I will review how PTAs search for gravitational waves and outline the properties of the newly detected signal. In particular, I will discuss why we cannot yet claim the detection of a GWB and which future steps will be necessary in order to finally reach this goal. In addition, I will highlight various possible interpretations of the signal, including supermassive black-hole binaries on the astrophysical side as well as various new-physics scenarios on the cosmological side, such as cosmological phase transitions and cosmic strings. Finally, I will conclude with a brief outlook on the future of the field, which is set to see some amazing progress in the coming years.

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