

What is the source of the gravitational waves detected by NANOGrav and other PTA experiments?

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The most conservative interpretation of the nHz gravitational waves discovered by NANOGrav and other Pulsar Timing Array (PTA) Collaborations is astrophysical, namely that they arise from supermassive black hole (SMBH) binaries. However, alternative cosmological models have been proposed, including cosmic strings, phase transitions, domain walls, primordial fluctuations and “audible” axions. We compare how well these different hypotheses fit the NANOGrav data, both in isolation and in combination with SMBH binaries, and address the questions: Which interpretations fit the data best, and which are disfavoured? We also discuss experimental signatures that can help discriminate between different sources of the PTA GW signal, including fluctuations in the signal strength between frequency bins, individual sources and how the PTA signal extends to higher frequencies.

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