

Binary Pulsars Hunting Ultra-light Dark Matter

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Ultra-light dark matter (ULDM) is a promising candidate for cosmological dark matter. If ULDM exists and interacts directly with ordinary matter, it could produce characteristic signals in the timing data of pulsars in binary systems.

In this talk, we review the latest results on how binary pulsars can constrain the ULDM parameter space through pulsar timing data and signal modeling. Our analysis employs two independent methods: (1) Bayesian model comparison and (2) deep neural networks. We compare the strengths and weaknesses of each approach, present the sensitivity limits they yield, and discuss prospects for future research.

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