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Angular correlation and deformed Hellings-Downs curve by spin-2 ultralight dark matter

The pulsar timings are sensitive to both the nanohertz gravitational-wave background and the oscillation of ultralight dark matter. The Hellings-Downs angular correlation curve provides a criterion to search for stochastic gravitational-wave backgrounds at nanohertz via pulsar timing arrays. We study the angular correlation of the timing residuals induced by the spin-2 ultralight dark matter, which is different from the usual Hellings-Downs correlation. At a typical frequency, we show that the spin-2 ultralight dark matter can give rise to the deformation of the Hellings-Downs correlation curve induced by the stochastic gravitational wave background.[2402.03984]

Primary author: Dr ZHANG, Yun-Long (NAOC (National Astronomical Observatories, CAS))

Co-authors: Prof. CAI, Rong-Gen; Mr ZHANG, Jing-Rui

Presenter: Dr ZHANG, Yun-Long (NAOC (National Astronomical Observatories, CAS))

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