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## **Stochastic and secular anomalies in measurements of pulsar braking indices**

Stochastic (i.e. the achromatic component of timing noise unrelated to interstellar propagation) and secular variations in the spin frequency  $\nu$  of a rotation-powered pulsar complicate the interpretation of the measured second derivative of the spin frequency  $\ddot{\nu}$ , and hence the braking index,  $n$ , in terms of a power-law spin-down torque  $\propto \nu^{n+1}$ . Both categories of variation can lead to measurements of  $\ddot{\nu}$  which yield anomalous braking indices, i.e.  $|n| = |\nu\ddot{\nu}/\dot{\nu}^2| \gg 1$ , where the overdot symbolizes a derivative with respect to time. In this talk, I will discuss the following three key results. First, the combined effect of stochastic and secular deviations from pure power-law spin down on measurements of  $\ddot{\nu}$  and its implications in observationally constraining  $n$ . Second, how the variance of  $\ddot{\nu}$  (or equivalently  $n$ ) satisfies a falsifiable, analytical result derived from first principles. We quantify said variance through analytic calculations, Monte Carlo simulations involving synthetic data from a phenomenological model, and modern Bayesian techniques. Third, how the variance of  $\ddot{\nu}$  may be applied to real astronomical situations to predict or interpret the measured braking index  $n$ .

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