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The variance of the Hellings-Downs curve

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Recently different Pulsar Timing Array collaborations have found evidence of a gravitational wave background, consistent with an astrophysical background from black hole binaries in the inspiraling phase. To claim a detection, one has to measure an almost-quadrupolar correlation between the time of arrival of pulses from an array of pulsars: the Hellings-Downs curve. I will address the question: assuming noise-free measurements, how well do we expect data to follow this curve? I will review different sources of “theoretical” variance affecting this curve, focusing in particular on the effect of source clustering on the pulsar correlations.

Orateur: CUSIN, Giulia (IAP)