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Optimal phase response curves for stochastic synchronization of limit-cycle oscillators by common Poisson noise

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We consider optimization of phase response curves for stochastic synchronization of non-interacting limit-cycle oscillators by common Poisson impulsive signals. The optimal functional shape for sufficiently weak signals is sinusoidal, but can differ for stronger signals. By solving the Euler-Lagrange equation associated with the minimization of the Lyapunov exponent characterizing synchronization efficiency, the optimal phase response curve is obtained. We show that the optimal shape mutates from a sinusoid to a sawtooth as the constraint on its squared amplitude is varied.

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