

Abstract Submitted
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Applications of the first digit law to measure correlations¹ REID GRAMM, JACK YOST, RAINER GROBE, Q. CHARLES SU, Illinois State University — The quasiempirical Benford law predicts that the distribution of the first significant digit of random numbers obtained from mixed probability distributions is surprisingly meaningful and reveals some universal behavior. We generalize this finding to examine the joint first-digit probability of a pair of two random numbers and show that undetectable correlations by means of the usual covariance-based measure can be identified in the statistics of the corresponding first digits. We illustrate this new measure by analyzing the correlations and anticorrelations of the positions of two interacting particles in their quantum mechanical ground state. This suggests that by using this measure, the presence or absence of correlations can be determined even if only the first digit of noisy experimental data can be measured accurately. [1] R. Gramm, J. Yost, Q. Su and R. Grobe, Phys. Rev. E 95 042136 (2017).

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Rainer Grobe
Illinois State University

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