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Remarks about inhomogeneous pair correlations

A sequence a_n of natural numbers is said to have metric Poissonian pair correlations (MPPC) if for almost every real number α the associated sequence $\alpha a_n \pmod 1$ on the circle has asymptotically Poissonian pair correlations. Informally speaking, this means that the points of the sequence clump together to the same extent that they would if they had been picked randomly. For example, the sequence of natural numbers does not have MPPC, while the sequence of square numbers does. Generally, if a sequence has too much additive structure, like the natural numbers, then it will not have MPPC. If it has very little additive structure, like the squares or the powers of 2, then it will have MPPC. But there is a zone in between "too much additive structure" and "very little additive structure" where the picture is not so clear, and there has been a lot of work devoted to finding an "additive energy threshold" separating sequences with MPPC from those without. I will survey this work, and I will discuss an associated inhomogeneous problem where the corresponding questions seem to be easier to answer.