ON AUTOCORRELATIONS OF SOME APERIODIC MULTIPLICATIVE FUNCTIONS

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ABSTRACT: The Chowla conjecture from 1965 predicts that all autocorrelations of the Liouville function vanish. In fact, after an obvious adaptation, the Chowla conjecture was expected to hold for all aperiodic multiplicative functions with values in the unit disc (cf. Elliot's conjecture from the 1990s). But in 2015, Matomäki, Radziwiłł and Tao gave a counterexample to Elliot's conjecture by constructing aperiodic multiplicative functions (bounded by 1) for which (already) the Chowla conjecture of order 2 fails. During the talk I will explain however that, along a subsequence, the Chowla conjecture holds for Matomäki, Radziwiłł, Tao's functions. This is achieved by detecting certain algebraic dynamical systems (called Furstenberg systems) obtained by examining autocorrelations along subsequences and, moreover, it disproves a conjecture by Frantzikinakis and Host concerning logarithmic autocorrelations of multiplicative functions. The talk is based on my joint work with Alex Gomilko and Thierry de la Rue.