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Discrepancy Problems for Multiplicative Functions in Function Fields

The Erdős Discrepancy Problem (EDP), now a theorem due to Tao, posits that any $\{-1, +1\}$ -valued arithmetic sequence has arbitrarily large partial sums along suitable homogeneous arithmetic progression $\{dn : 1 \leq n \leq N\}$ (i.e., such sequences have *unbounded discrepancy*). Tao's solution to the EDP relies crucially on an analysis of the corresponding partial sums of completely multiplicative sequences.

We will present a classification of completely multiplicative sequences with uniformly bounded such sums in the function field setting, revealing that the analogue of the EDP is in fact false there. We will also address a question of Tao on the growth rate of such partial sums which is not known in the number field setting.

(joint work with Oleksiy Klurman and Joni Teräväinen)