

ZERO-SUM SQUARES IN BOUNDED DISCREPANCY $\{-1, 1\}$ -MATRICES

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We will start by presenting a combinatorial problem about square binary matrices called the Erikson matrix problem, proposed by Martin Erikson in 1996. The problem and its solution (given in 2010 by Bacher and Eliahou) represent a prototype result in Ramsey Theory. We will explore natural variations of the Erikson matrix problem where we seek zero-sum squares instead of constant squares. Meanwhile, we take the opportunity to present the philosophies behind Ramsey theory and zero-sum Ramsey theory, emphasizing its differences and similarities. We prove that every $\{-1, 1\}$ -matrix where the difference between the number of 1's and -1's is bounded contains a zero-sum (also called balanced) square except for a particular matrix. This is a joint work with Edgardo Roldán-Pensado and Alma Arévalo.