

Title: Interaction between skew-representability, tensor products, extension properties, and rank inequalities

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Abstract: Skew-representable matroids form a fundamental class in matroid theory, bridging combinatorics and linear algebra. Since deciding skew-representability is computationally intractable, much effort has been focused on identifying necessary or sufficient conditions for a matroid to be skew-representable. In this talk, we introduce a new approach to studying skew-representability and structural properties of matroids and polymatroid functions via tensor products. We provide a characterization of skew-representable matroids, as well as of those representable over skew fields of a given prime characteristic, in terms of tensor products. As an application of the tensor product framework, we give a new proof of Ingleton's inequality and, more importantly, derive the first known linear rank inequality for folded skew-representable matroids that does not follow from the so-called common information property. Joint work with Boglárka Gehér, András Imolay, László Lovász, Carles Padro, and Tamás Schwarcz.