Embedding partial Latin squares in Latin squares with many mutually orthogonal mates

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In this talk, I will review combinatorial constructions developed by Donovan, Grannell, and Yazıcı that verify that a pair of (partial) orthogonal Latin squares of order n, can be embedded in a set of $t+2$ mutually orthogonal Latin squares (MOLS) of polynomial order in n, for any $t \geq 2$. Notably, this construction verifies, for the first time, the existence of a set of nine MOLS of order 576, improving upon the earlier maximum of eight.

If time permits, I will also present earlier work by Donovan and Yazıcı, which provides the first constructive, polynomial-order embedding for a pair of orthogonal partial Latin squares.