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Modular Combinatorial Designs

In this talk we present a new concept what we call modular symmetric designs and use them to study modular Hadamard matrices. We prove that there exist 5-modular Hadamard matrices of order n if and only if \( n \not\equiv 3,7 \pmod{10} \) and \( n \neq 6,11 \). In particular, this solves the 5-modular version of the Hadamard conjecture.