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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.