Modular Reduction in Abstract Polytopes

Dedicated to Ted Bisztriczky, on his sixtieth birthday.

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Abstract. The paper studies modular reduction techniques for abstract regular and chiral polytopes, with two purposes in mind: first, to survey the literature about modular reduction in polytopes; and second, to apply modular reduction, with moduli given by primes in \( \mathbb{Z}[\tau] \) (with \( \tau \) the golden ratio), to construct new regular 4-polytopes of hyperbolic types \( \{3,5,3\} \) and \( \{5,3,5\} \) with automorphism groups given by finite orthogonal groups.