

# Huge Rings of low rank with a standard involution and quaternion rings

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007 Kemeny Hall, 4:00 pm  
(Tea 3:30 pm 300 Kemeny Hall)

## Abstract

A ring of rank  $n$  is an associative ring with identity that is free of rank  $n$  as a module over the integers  $\mathbb{Z}$  (i.e. is isomorphic to  $\mathbb{Z}^n$  as an abelian group). Bhargava and others have studied and classified commutative rings of rank at most 5. We consider the case where the ring is no longer (necessarily) commutative but possesses a standard involution. We characterize such rings by their degree, discuss the relationship to quaternion rings and ternary quadratic forms (due to Gross and Lucianovic), and provide a generalization to an arbitrary base ring.