

# ISU Algebra Seminar



**Title:** Existence of Trace-Zero Idempotents of Group Algebras of Finite Groups.

**Speaker:** Wenhua Zhao

**Time:** 1:00 pm - 1:50 pm on Thursday (11/19/20)

**Zoom Meeting ID:** 999 2980 5190      **Passcode:** AlgSeminar

**Abstract:**

Let  $G$  be a finite group and  $K$  a splitting field of  $G$  of characteristic  $p > 0$ . Denote by  $KG$  the group algebra of  $G$  over  $K$  and  $Z(KG)$  the center of  $KG$ . Let  $V_G$  be the  $K$ -subspace of trace-zero elements of  $KG$ . We give sufficient and necessary conditions for  $V_G$  and the intersection of  $V_G$  and  $Z(KG)$ , respectively, to be Mathieu subspaces of  $KG$  in terms of the degrees of irreducible (Brauer) representations of  $G$ . The same conditions also characterize the finite groups  $G$  that  $KG$  has no nonzero trace-zero idempotents and the finite groups  $G$  that  $KG$  has no nonzero central trace-zero idempotents, respectively. This is a joint work with Dan Yan.

**About Speaker:**

Dr. Zhao's research interests are on polynomial automorphisms and the Jacobian conjecture. Currently, he is working on a new notion of Mathieu subspaces, which he introduced in 2009. The new notion not only generalizes the fundamental notion of ideals, but also provides a uniform setting for several hard conjectures such as the Jacobian conjecture; the Dixmier conjecture; the Mathieu conjecture; the Image conjecture; the Vanishing conjecture; and the Gaussian Moment conjecture, etc. It is highly expected that the study of this new concept will also have profound impacts to many other mathematics areas besides the conjectures above.

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