

METU Mathematics Special Seminar

Asymptotics and Stability of Representation-Theoretic Invariants

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Abstract

There are many natural families of groups $(G_n)_{n \in \mathbb{N}}$, such as the symmetric groups $(S_n)_{n \in \mathbb{N}}$, the general linear groups $(GL(n, q))_{n \in \mathbb{N}}$, and the symplectic groups $(Sp(2n, q))_{n \in \mathbb{N}}$. The representation theory of these groups is often studied through algebraic and combinatorial invariants depending on n . As n grows, however, these invariants usually become increasingly complicated. A natural way to understand the representation theory of G_n for large n is therefore to look for stable or asymptotic patterns in the algebraic structures attached to the family.

One such algebraic object is the center $Z(\mathbb{C}[G_n])$ of the group algebra $\mathbb{C}[G_n]$, together with its structure constants with respect to a natural basis. This object is closely related to the irreducible characters of G_n , as, under the usual coefficient-identification function, the center may be identified with the space of class functions on G_n , and hence with the inner product space spanned by the irreducible characters. The classical result in this direction is the theorem of Farahat and Higman for symmetric groups. After a suitable reparametrization of conjugacy classes, the structure constants of the centers $Z(\mathbb{C}[S_n])$ are polynomial functions of n . Later, Ivanov and Kerov gave a more conceptual explanation of this phenomenon through the algebra of partial permutations.

In this talk, we will first explain the Farahat–Higman stability theorem for symmetric groups and then discuss analogues beyond S_n . We will then revisit the symmetric-group case from the Ivanov–Kerov point of view, in order to clarify the mechanism behind the stability phenomenon. Finally, if time permits, we will briefly discuss the irreducible characters of S_∞ and indicate how the constructions of Farahat–Higman and Ivanov–Kerov enter into the asymptotic representation theory of symmetric groups.

Date: Wednesday, 20 May 2026

Time: 15:40

Place: Gündüz İkedâ Seminar Room