

# Expanders in Group algebras

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## Abstract

Let  $G$  be a finite group and let  $p$  be a prime such that  $(p, |G|) = 1$ . We study conditions under which the Abelian group  $F_p[G]$  has a few  $G$ -orbits whose union generate it as an expander (equivalently, all the discrete Fourier coefficients (in absolute value) of this generating set are bounded away uniformly from one).

We prove a (nearly sharp) bound on the distribution of dimensions of irreducible representations of  $G$  which implies the existence of such expanding orbits. We further show a class of groups for which such a bound follows from the expansion properties of  $G$ . Together, these lead to a new iterative construction of expanding Cayley graphs of nearly constant degree.