

## EXPANDERS, GHOSTS AND AMENABLE ACTIONS

Sequences of expander graphs were first explicitly constructed by Margulis in 1975 using property (T) and have had a wide range of applications to number theory and computer science. In this talk we will discuss an application of expander graphs to operator algebras and dynamical systems. In particular the Laplace operator on a sequence of expanders gives rise to a strange operator called a ghost. We will see in fact that these operators become very interesting when the space may not necessarily be an expander but have expansion type properties.

We will explore the following surprising connection between ghost operators and dynamical systems in the class of groups. Indeed a discrete group  $\Gamma$  will admit only compact ghost operators if and only if  $\Gamma$  acts amenably on its Stone-Ćech compactification  $\beta\Gamma$  if and only if  $\Gamma$  is exact in a suitable operator algebraic sense. We will extend this equivalence to the setting of locally compact second countable groups. This is joint work with Jacek Brodzki and Kang Li.