

Department of Mathematics, BGU

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# Operator Algebras and Operator Theory

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*On Wednesday, March 15, 2023*

*At 12:00 – 13:00*

*In Minus 101*

N. Christopher Phillips (University of Oregon)

will talk about

## **Large finite values of Rokhlin dimension with commuting towers**

Abstract: This is joint work with Ilan Hirshberg.

Recall that an action of a group  $G$  on a set  $X$  is free if every nontrivial group element acts with no fixed points, such as the action of  $G$  on itself by translation.

Now assume  $G$  is compact, and consider an action of  $G$  on a unital  $C^*$ -algebra. Finite Rokhlin dimension (with commuting towers, the only version we consider here) is one of several possible noncommutative versions of freeness. To put it in context, the action of  $G$  on  $G \times X$  by translation in the first variable has Rokhlin dimension zero, while the action  $x \mapsto -x$  of the two element group  $Z_2$  on the sphere  $S^d$  has Rokhlin dimension  $d$ .

What are the possible values of Rokhlin dimension for actions on simple  $C^*$ -algebras? Rokhlin dimension zero is just the (much older) Rokhlin property, and

many examples are known. Several examples are known with Rokhlin dimension exactly one, and one with Rokhlin dimension exactly two, but until now no examples were known to have Rokhlin dimension finite but greater than two, even without knowing the exact value.

We construct actions of finite groups and the circle  $S^1$  on simple  $C^*$ -algebras, in some cases even simple AF algebras, for which we can prove that the Rokhlin dimension is large but finite. One of our most precise results is that for every positive even integer  $d$ , there is an action of  $\mathbb{Z}_2$  on a simple unital AF algebra whose Rokhlin dimension is exactly  $d$ . However, much remains open about the possible values of Rokhlin dimension for actions of compact groups on simple  $C^*$ -algebras.

**Please Note the Unusual Day and Time!**