

- SOL SUSANA SANTOYO OLIVERA, *Groups of automorphisms on Hilbert spaces and probability algebras*.

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We will discuss expansions of the continuous theories **IHS** and **APr** of infinite-dimensional Hilbert spaces and of atomless probability algebras, respectively. Both have interesting model-theoretic properties: they are complete, ω -categorical, model complete and ω -stable (see [1] and [2]).

Fix a countable group G , and let T be one of the two theories mentioned above. We expand the language to include a new unary function symbol for each element of G , and we define T_G to be the theory of all models of T with a distinguished group of automorphisms isomorphic to G . The models of **IHS** $_G$ are exactly the infinite-dimensional unitary representations of G , while the models of **APr** $_G$ correspond to measure-preserving actions on atomless probability spaces. In both cases, T_G has a well behaved model companion T_G^+ . In the talk, we will present the following properties of these theories:

If G is finite and $T = \mathbf{IHS}$, one can use tools from representation theory (see [3]) to classify the models of T_G . In joint work with A. Berenstein we do a similar analysis when $T = \mathbf{APr}$ using tools from ergodic theory, namely, an exact version of Rokhlin's lemma. In both cases we can conclude that T_G^+ is ω -categorical, ω -stable and admits quantifier elimination. If G is infinite, but abelian, we have approximate versions of these results. For this case, the main tools when $T = \mathbf{IHS}$ come from spectral theory (see [3]) and when $T = \mathbf{APr}$ we use instead Rokhlin's lemma.

Finally, we can assign to a model of **APr** $_G$ a model of **IHS** $_G$, called its *Koopman representation*. We will present a new result, based on the characterization of existential closedness in [3]: the Koopman representation of an existentially closed model of **APr** $_G$ is also existentially closed.

[1] YAACOV, I BEN AND BERENSTEIN, ALEXANDER AND HENSON, C WARD AND USVYATSOV, ALEXANDER, *Model theory for metric structures*, London Mathematical Society Lecture Note Series, vol.350, Cambridge University Press, 2008.

[2] BERENSTEIN, ALEXANDER AND HENSON, C. WARD, *Model theory of probability spaces*, *Walter de Gruyter GmbH & Co KG*, vol. 11 (2023), pp. 159.

[3] BERENSTEIN, ALEXANDER AND PÉREZ, JUAN MANUEL, *Model Theory of Hilbert Spaces with a Discrete Group Action*, *arXiv preprint arXiv:2409.03923*, (2024).