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Representation of probability measures and compacta through dualization of convex spaces and Sierpinski modules

The concept of dualization of linear spaces admits a far-reaching generalization through the notion of an *algebraic duality* [3], i.e., a contravariant adjunction between (enriched) algebraic categories. Every algebraic duality is induced by a *dualizing algebra* and determines an induced notion of *distribution* that specializes to yield various kinds of measures, Schwartz distributions, filters, closed subsets, compacta, and so forth [2].

In this talk, we will consider three examples of algebraic dualities enriched in the category of convergence spaces, one involving convex spaces and *based involutive convex spaces*, and two involving modules for the *Sierpinski rig* or the *dual Sierpinski rig*. We show that for locally compact Hausdorff spaces the induced notions of distribution in these examples are the notions of Radon probability measure, closed subset, and compact subset, respectively. In proving these results we employ R. C. Buck's representation theorem for bounded measures [1] as well as the Hofmann-Mislove theorem.

[1] R. C. Buck, Bounded continuous functions on a locally compact space. *The Michigan Mathematical Journal* 5 (1958) 95—104.

[2] R. B. B. Lucyshyn-Wright, Functional distribution monads in functional-analytic contexts. *Advances in Mathematics* 322 (2017), 806–860.

[3] R. B. B. Lucyshyn-Wright, Algebraic duality and the abstract functional analysis of distribution monads. Talk at *CT 2017: International Category Theory Conference*, Vancouver, July 2017.