

# **Functional Analysis, Mathematical Physics, and Dynamical Systems**

**(FAMPDS)**

**Joint American-Ukrainian Virtual Colloquium Series**

**Spring 2021**

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## **Talk 11: *On Decompositions of an Operator into a Sum of Projections***

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### **Abstract**

Linear combinations of orthoprojections (in short, projections), in particular their sums, appear in various problems of operator theory and its applications. A classical result is the spectral theorem on decomposition of a self-adjoint operator with a finite spectrum into a linear combination of projections onto the eigenspaces, the projections being pairwise orthogonal. Excluding the orthogonality condition for projections leads to interesting. For instance, every bounded self-adjoint operator is a linear combination of 4 projections (or an integral combination of 5 projections). Also, operators from a wide class can be decomposed into sums of a small number of projections. Such decompositions are used in different numerical problems, especially where the calculation process can be parallelized, in information theory (frames as codes), and in quantum information theory. We discuss the known facts on sums of projections, describe general methods of constructing various decompositions, and partially consider numerical applications.

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**Friday, May 21, 10:00-11:00 AM (PDT), 20:00-21:00 (EEST)**

**Online via Zoom at**

<https://fresnostate.zoom.us/j/5233106532>