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Thursday  
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2:00 - 3:00 p.m.  
Education Building 623



## Vector-Valued Logarithmic Residues, Vanishing Sums of Idempotents and Unusual Cantor Sets

A basic result from complex function theory states that the logarithmic residue (i.e., the contour integral of the logarithmic derivative) of a scalar analytic function can only vanish when the function has no zeros inside the contour. Question: does this result generalize to the vector-valued case?

Assuming that the functions in question take values in a Banach algebra, the answer depends on which Banach algebra. Positive results have been obtained for large classes of algebras, among them that of the polynomial identity Banach algebras. Instrumental in this context is what is called non-commutative Gelfand theory involving the use of families of matrix representations.

There is a close connection between logarithmic residues and sums of idempotents. Pursuing this connection, negative answers to the above question have come up via the construction of non-trivial zero sums of a finite number of idempotents. It is intriguing that only five idempotents are needed in all known examples. The idempotent constructions relate to deep problems concerning the geometry of Banach spaces and general topology. In particular a novel approach to the construction of Cantor type sets plays a role.

The talk - accessible to non-specialists - reports on joint work with Torsten Ehrhardt (Santa Cruz, California) and Bernd Silberman (Chemnitz, Germany).