Derivations on Murrey-von Neumann algebras

F. Sukochev[1]

This talk presents an account of joint work with Aleksey Ber, Jinghao Huang and Karimbergen Kudaybergenov, whose large part can be found in the paper, *Notes on derivations of Murray–von Neumann algebras*, *Journal of Functional Analysis,* **279** (2020), no. 5, 108589, 26 pp (by A. Ber, K. Kudaybergenov, F. Sukochev).

Recall, that a fat Cantor set E in $[0,1]$, is nowhere dense (in particular it contains no intervals), yet has positive Lebesgue measure. Further, it is well-known that its characteristic function χ_E is approximately differentiable but nowhere differentiable function. Firstly, we explain the description of the algebra of all approximately differentiable functions on $(0,1)$ (which is probably well known to the experts) and then introduce the algebra of all approximately differentiable operators affiliated with the hyperfinite II_1 factor (introduced by von Neumann in 1930's). To this end, I shall briefly explain major results/notions concerning derivations on algebras of unbounded operators.

Next, I shall explain that the classical differential operator $\partial : D(0,1) \mapsto S(0,1)$ acting from the algebra of all differentiable functions on $(0,1)$ into the algebra of all Lebesgue measurable functions allows an extension to the differential operator on the algebra $S(0,1)$. However, any such extension cannot be translation-invariant, which is in the strong contrast with the properties of ∂.

[1]University of New South Wales, Australia. Email: f.sukochev@unsw.edu.au