The strong maximal function on von Neumann algebras

ICMAT 17-21 June 2019

Adrián González-Pérez
KU Leuven, Belgium
`adrian.gonzalezperez@kuleuven.be`

For a finite von Neumann algebra $\mathcal{M}$ the notion of *bilateral almost uniform* convergence generalizes almost everywhere convergence over measure spaces. The main approach for dealing with problems of almost uniform convergence, both in the classical as well as in the von Neumann algebra setting, is by means of maximal inequalities. In the talk we will start by presenting a new construction that generalizes the $\limsup$ of a family of functions to the von Neumann algebra case. This allows to prove a noncommutative analogue of the inequalities of Jessen, Marcinkiewicz and Zygmund. In particular, we obtain that for every $x \in L\log^2 L(\mathcal{M} \bar{\otimes} \mathcal{M})$, the double martingale $(\mathbf{E}_n \otimes \mathbf{E}_m)(x)$ converge bilaterally almost uniformly as $n, m \to \infty$. The we will also explore applications of this result to free groups.

—Joint work with Jose Manuel Conde Alonso and Javier Parcet—