Analysis Seminar

Title: Lipschitz-free spaces over properly metrisable spaces and approximation properties

Speaker: Filip Talimdjioski

Date: Tue 5th December 2023 at 12:00AM

Location: E0.32 (beside Pi restaurant)

Abstract: Let T be a topological space admitting a compatible proper metric, that is, a locally compact, separable and metrisable space. Let $\mathcal{M}^T$ be the non-empty set of all proper metrics d on T compatible with its topology, and equip $\mathcal{M}^T$ with the topology of uniform convergence, where the metrics are regarded as functions on T^2. We prove that the set $\mathcal{A}^{T,1}$ of metrics $d \in \mathcal{M}^T$ for which the Lipschitz-free space $\mathcal{F}(T,d)$ has the metric approximation property is a dense set in $\mathcal{M}^T$, and is furthermore residual in $\mathcal{M}^T$ when T is zero-dimensional. We also prove that if T is uncountable then the set $\mathcal{A}_f^T$ of metrics $d \in \mathcal{M}^T$ for which $\mathcal{F}(T,d)$ fails the approximation property is dense in $\mathcal{M}^T$. Combining the last statement with a result of Dalet, we conclude that for any 'properly metrizable' space T, $\mathcal{A}_f^T$ is either empty or dense in $\mathcal{M}^T$.

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