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Barcelona Analysis Seminar **2023–2024**

Date: February 01, 2024

Time: 15:00 CET

Room: T2 (Universitat de Barcelona)

Abundance of triangles in thin fractal sets

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The classic Mattila-Sjolin theorem states that if a compact subset of $\mathbb{R}^d$, $d \geq 2$, has Hausdorff dimension at least $\frac{d+1}{2}$ then its set of distances has non-empty interior. In this talk we present an analogue of the Mattila-Sjolin theorem, namely that if a compact subset of $\mathbb{R}^d$, with $d > 3$, has Hausdorff dimension greater than $\frac{2d}{3} + 1$ then its set of triangles has non-empty interior. Moreover, we show an extension of this result for the case $d = 3$. Recently Greenleaf, Iosevich and Taylor used Fourier Integral Operator (FIO) methods to show an analogue of the Mattila-Sjolin theorem for many k-point configurations in $\mathbb{R}^d$. However, the case $d = 3$, for the triangle problem has remained elusive regardless of how the triangles are encoded. We overcome this issue by adapting techniques from recent results on the existence of point configurations due to Iosevich and Liu, and Iosevich and Magyar. These types of results on point configurations with non-empty interior can be categorized as extensions and refinements of the statement in the well known Falconer distance problem which establishes a positive Lebesgue measure for the distance set instead of it having non-empty interior.

More information at: `https://mat.uab.cat/web/seminarianalisi/`