DEBORAH OLIVEROS, Instituto de Matemáticas UNAM
The geometry and combinatorics of discrete line segment hypergraphs

An r-segment hypergraph H is a hypergraph whose edges consist of r-consecutive integer points on line segments in $\mathbb{R}^2$. In this talk, we will present some results in the chromatic number $\chi(H)$ and covering number $\tau(H)$ of hypergraphs in this family, uncovering several interesting geometric properties in the process. We provide improved (in fact, optimal) bounds on $\tau(H)$ for $r \leq 5$ and provide sharp bounds on the chromatic number $\chi(H)$ in terms of r, and use them to prove two fractional versions. Joint work with Christopher O'Neill and Shira Zerbib