

Thursday, June 13th, 12:00-13:00
Seminar Room at the Mathematics Department of UPV/EHU

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IMPROVED BOUNDS FOR KAKEYA IN INTERMEDIATE DIMENSIONS USING SEMIALGEBRAIC GEOMETRY

We will consider the Kakeya conjecture; the hope that δ -tubes, which point in directions which are separated by δ , cannot be compressed very much by positioning them strategically. This can be formulated precisely as a lower bound on the measure of any set that contains the tubes. On the one hand, we will see that the conjectured bound holds when the containing set is a neighborhood of any real algebraic variety, confirming a conjecture of Guth. The proof employs tools from the theory of semialgebraic sets including Gromov's algebraic lemma and Tarski's projection theorem. On the other hand, we will use polynomial partitioning to prove that the conjectured bound holds when there is a total absence of algebraic structure. Balancing between the two cases yields improved bounds in certain intermediate dimensions. This is joint work with Jonathan Hickman and Nets Katz.