

Abstracts

Coverings and metric entropy: duality

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A well known 30 year old conjecture in the field of Asymptotic Geometric Analysis is the duality of entropy numbers conjecture, which in the language of covering numbers states that for two convex bodies K and T , as functions of t , the covering number of K by tT (denoted $N(T, tK)$) and the covering number of T° by tK° are equivalent in an appropriate sense, where K° and T° denote the polar bodies of K and T respectively. The most important case (which is the one appearing in applications to probability theory, ergodic theory, learning theory and other fields) is when one of the two bodies is assumed to be the euclidean ball. This case has been intensively studied, and in 2003, jointly with V. Milman and S. Szarek, we proved the duality conjecture in this case.

The case of two general convex bodies, or equivalently of an operator between two general spaces, is still under investigation, however we have managed to prove a generalization of the theorem to the case in which one of the spaces has some non trivial type $p > 1$ (and the constants involved in the theorem will depend both on the type p and on the type constant of the space). These include, in particular, all ℓ_p and L_p spaces (classical or non-commutative) for $1 < p < \infty$, and similarly all uniformly convex and uniformly smooth spaces. This is joint work with V. Milman, S. Szarek and N. Tomczak-Jaegermann.

In the talk I will discuss these result and present, as much as time will permit, the main ideas and line of proof.