

Covering dimension using toric varieties

In this talk we will discuss some “quantitative covering dimension” theorems, like the Lebesgue theorem about the cube and the Knaster–Kuratowski–Mazurkiewicz theorem about the simplex. For example, the latter theorem asserts that an open or closed covering of an n -dimensional simplex with multiplicity at most n must have a set that touches every facet of the simplex.

We present a new approach to these theorems, based on some elementary toric geometry and related to the previous results on “topological central point theorem”. This approach provides a unified point of view on such results and allows to generalize them to some extent. In particular, it gives an answer to a question of Dömötör Pálvölgyi on mathoverflow.net.