Covering finite grids

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The set $0,1^n$ in $\mathbb{R}^n$ can be covered by just two hyperplanes, but as soon as we require that one point should not be touched, the minimum number of hyperplanes needed to cover the rest is n. This was shown by Alon and Füredi in 1993, using the polynomial method. If the grid is $\mathbb{F}_q^n$, then the minimum number of hyperplanes required is $(q-1)n + 1$, which is an even older result of Jamison from 1977, and it has many applications in finite geometry.

In this talk, we will discuss several variations of such grid-covering problems, like covering with multiplicity and covering with other subspaces, along with some recently obtained results.