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Minisymposium 4 - Spectral Theory and Ergodic Operators

Arctic phenomena in random tilings with fixed boundaries, in dimensions 2 and 3

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The effects of boundaries on macroscopic quantities such as entropy and tile statistics are discussed in random tilings of rhombi, dominoes or rhombohedra. The states that dominate the statistical ensemble of tilings are characterized. We show that under specific boundary conditions, they can display a strong structural inhomogeneity: The tilings are "frozen" on macroscopic regions near the boundary and only display a random character inside the "arctic" frontier. This effect is, in particular, responsible for a large difference of entropy between fixed boundary tilings and free or periodic boundary ones. We present the variational principle accounting for this arctic phenomenon. The results are demonstrated by a combination of exact and/or numerical approaches.