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Small covers of big surfaces

Imagine the plane \mathbb{R}^2 where every point with integer coordinates has been removed. Call this surface X . Which surfaces arise as finite-sheeted covers of X ? Which surfaces can X cover by finitely-many sheets?

I will talk about work Alan McLeay investigating the above seemingly innocent questions, and the more general version: Given two surfaces, when does there admit a finite-sheeted cover of one over the other? A complete answer is available if the two surfaces are of finite type. In the infinite-type world, the question is less innocent than one might expect.