# Probability Seminar

**Title:** The mirror model with weight $n^{\#\text{loops}}$ - breaking translation invariance for large $n$

**Speaker:** Kieran Ryan (Aalto University)

**Date:** Wed 1st November 2023 at 3:00PM

**Location:** E0.32 (beside Pi restaurant)

**Abstract:** Consider the Lorentz mirror model on the 2d lattice: at each lattice site, independently place a mirror at 45 degrees to the lattice with some probability $p$. The orientation of the mirror is chosen independently, say north-west with probability $0 < q < 1$. Loops can then be formed which bounce off the mirrors, or pass straight through lattice sites with no mirror. What is the probability that the loop through some given edge is infinite? For $p = 1$ it is zero, but for $0 < p < 1$ the problem is open. We study this model where we re-weigh the measure by $n^{\#\text{loops}}$, $n > 0$. We discuss a form of breaking of translation invariance, where for $n$ large, the almost all the loops are trivial loops surrounding black faces, or trivial loops surrounding the white faces. We can see that the method applied also works for a model of loops coming from a 1D quantum spin system, where the breaking of translation invariance is known as dimerisation.

This is joint work with Jakob Björnberg.