Infinite range continuum percolation models

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In the classical Boolean percolation model, one starts with a homogeneous Poisson process η in R^d with intensity λ, and around every $x \in \eta$, one places a ball of radius 1. In the talk I will discuss two variants of this model, both which are infinite range. In the first case, the percolative objects are taken to be bi-infinite cylinders with radius 1. We then investigate what the connectivity structure of the resulting set is, and how this depends on the underlying geometry (Euclidean vs hyperbolic). In the second case, we replace the balls with attenuation functions. That is, we let $l : (0, \infty) \to (0, \infty)$ be some non-increasing function and for every $y \in R^d$ we define $\Psi(y) := \sum_{x \in \eta} l(|x - y|)$. We study the level sets $\Psi_{\geq h}$, which is simply the set of points where the ran-dom field Ψ is larger than or equal to h. We determine for which functions l this model has a non-trivial phase transition in h. In addition, we will discuss some classical results and whether these can be transferred to this setting.

The first part is joint work with Johan Tykesson while the second part is joint work with Ronald Meester.