On the colored radial spanning tree and colored directed spanning forest of a bivariate Poisson point process

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In the radial spanning tree (RST), each vertex is connected to a unique root vertex by a path of edges to the locally nearest neighbor closer to the root than the current position. Assuming that a stationary Poisson point process models the locations of vertices, we obtain a stochastic model that can be applied, for example, to wireless sensor networks. Such networks are composed of spatially dispersed autonomous sensors that monitor certain physical conditions of the environment and forward the collected data to a base station, where the information can be processed. We discuss the generalization of the RST (and its limit far away from the root, called directed spanning forest) to a hierarchical setting, where a bivariate Poisson point process plays the role of the (random) vertex set. In other words, we equip each vertex with an independent mark (with values one or two) indicating its rank in the hierarchy. Then, we start by constructing a RST over the set of all vertices with mark one. Finally, we connect vertices with mark two to their locally nearest neighbours, disregarding the mark of the latter.

The talk is based on joint work with Markus Kiderlen.