

**Date:** June 1, 2021

**Speaker:** Jan Grebík

**Title:** Descriptive combinatorics of actions of  $\mathbb{Z}^d$

**Abstract:** Locally checkable labeling (LCL) problems are graph problems where the validity of a solution can be checked locally. Examples include proper vertex or edge colorings, perfect matching etc. Such problems have been studied from different points of view. I will discuss some recent result that connects the area of descriptive combinatorics, distributed computing and random processes.

In this talk I will focus on descriptive complexity classes in the context of oriented paths and grids. This setup corresponds to labeling problems on the Cayley graphs that are induced by free Borel actions of  $\mathbb{Z}^d$ . In the case  $d=1$  we present a full classification of LCLs and in the case  $d>1$  we focus on so-called TOAST algorithms.

All of this is a joint work with Vašek Rozhoň, see [arXiv:2103.14112] and [arXiv:2103.08394].