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GeomTop Seminar: "Sandpile monomorphisms and scaling limits"

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The sandpile group, also referred to as the critical group, is a refinement of the number of spanning trees on a given undirected multigraph. The study of the sandpile group originated in the physical literature, specifically in the analysis of the so called sandpile model, a cellular automaton which serves as the archetypical example for self-organized criticality, an important phenomenon in physics, biology, neuroscience and many other fields. The concept of criticality is based on the idea that certain systems show "similar" spatio-temporal dynamics at different scales, which lead to the development of renormalization group theory and similar mathematical concepts describing the limits of certain properties of such systems on infinite domains (graphs). Despite this backdrop, no mathematical definition for the scaling-limit of the sandpile group itself yet exists. In this talk, we introduce a tiling problem with finite open convex polyforms. We show that, if there exists a tiling of the polyform P2 by P1, one can construct a monomorphism between the sandpile groups corresponding to the respective polyforms. The direct limits of infinite series of such tilings then provide the first definitions of scaling-limits of the sandpile group on the standard square lattice, and on similar infinite domains. At the end of the talk, we discuss the open question if these limits are independent of the sequence of polyforms.
Joint work with Mikhail Shkolnikov.

Wednesday, August 7, 2019 01:00pm - 02:15pm
IST Austria Campus Mondi Seminar Room 3, Central Building

This invitation is valid as a ticket for the IST Shuttle from and to Heiligenstadt Station. Please find a schedule of the IST Shuttle on our webpage: https://ist.ac.at/en/campus/how-to-get-here/ The IST Shuttle bus is marked IST Shuttle (#142) and has the Institute Logo printed on the side.