Colloquial talk - Spring 2023 - Wednesday, **March 22, lecture hall M1, 4 pm**

Jon Noel

Title: Squaring the Circle with Simple Pieces

Abstract:
Is it possible to partition a disk in the plane into finitely many pieces and re-assemble those pieces via isometries to yield a partition of a square? This question was asked by Tarski back in 1925 and answered in the affirmative by Laczkovich some 65 years later.
 Laczkovich's proof uses the Axiom of Choice in a strong way; as a result, the pieces of his partition are very hard to imagine. In 2017, two new proofs emerged which achieve pieces that are Lebesgue measurable or even Borel; the latter result is fully "constructive." We improve on these results by constructively achieving pieces which have (a) lower Borel complexity and (b) "small" boundaries. A benefit of the second condition is that the pieces of our partition are, in some sense, "visualizable." The proof uses basic concepts in graph theory, such as Eulerian tours, matchings and network flows. Based on joint work with András Máthé and Oleg Pikhurko.