University of CINCINNATI | TAFT RESEARCH CENTER

**The Department of
Mathematical Sciences
Welcomes**

2023 Taft Lecturer

Dr. Anton Lukyanenko

**Assistant Professor
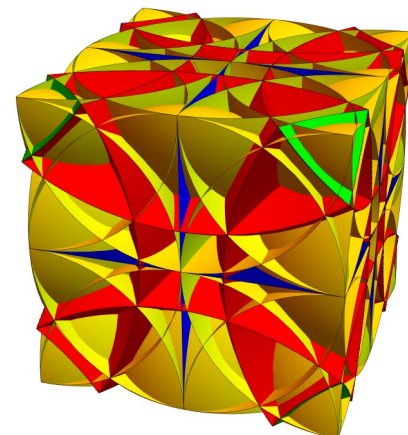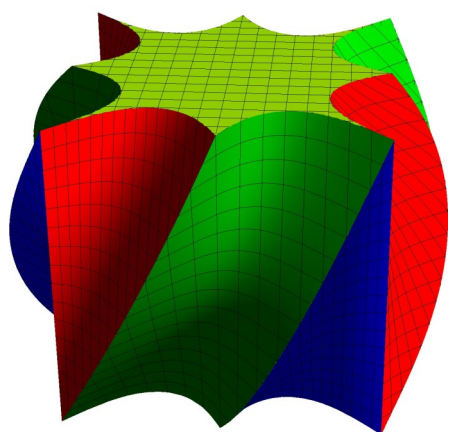Department of Mathematics
George Mason University**

Friday, March 24th 2023

Swift Hall Room 800

4:00-5:00pm

Fractal Geometry of Numbers

Pick a random real number and write it in base-2, so that all of its digits are 0s and 1s. How many 0s do you see in the first 1000 digits, and how many 1s? The counts should be roughly equal, displaying a dynamical property called ergodicity. In fact, regardless of the number you chose, any finite string of 0s and 1s (say, encoding your name) will almost surely appear infinitely many times in the infinite string of digits, with a certain guaranteed frequency.

In this talk, I will show how the study of ergodicity for base-b and continued-fraction expansions reveals a fractal structure in the real numbers, which gets all the more intricate when we work over complex numbers, quaternions, and octonions. As a bonus, we will talk about number theory in the non-Euclidean Heisenberg group, which comes up in a variety of fields ranging from quantum physics to models of the human visual cortex.

Refreshments will be served 3:15-3:45pm in the Math Faculty
& Graduate Student Lounge Room 4118 French Hall West