

SPEAKER: Robert Rumely (University of Georgia)

TITLE: The Berkovich Julia set of a rational function and the equicontinuity locus

ABSTRACT: 1) Preliminary Talk for Graduate Students:

Title: *P-adic complex numbers and the Berkovich Line.*

This talk will be an introduction to the field of p-adic complex numbers and the Berkovich Projective Line. The field of p-adic complex numbers is a complete, algebraically closed field of infinite degree over the usual p-adic numbers, and in its usual topology is totally disconnected and not compact. The Berkovich Projective Line is a space which contains the p-adic complex numbers as a dense subset, and is constructed from it in a functorial way, but which is both path-connected and compact. It is the most natural domain for carrying out analytic arguments in a nonarchimedean setting, such as those required in arithmetic dynamics.

2) Joint Number Theory Seminar of New York

Title: *The Berkovich Julia set of a rational function.*

The Berkovich Projective Line is the most natural setting for studying the dynamics of a rational function over a nonarchimedean field. The Berkovich Julia Set is an important arithmetic invariant attached to a rational function of degree at least 2. It carries a canonical probability measure that is both forwards and backwards invariant under the action of the function, which appears in arithmetic equidistribution theorems for small points.

This talk will discuss the action of a rational function on Berkovich Space, in particular its action near fixed points, and characterizations of the Berkovich Julia set, which is 1) the support of the canonical measure; 2) the minimal bi-invariant closed set disjoint from the classical exceptional locus; 3) the locus of points such that the union of the forward images of any neighborhood of the point omits at most the classical exceptional locus; 4) the closure of the set of repelling periodic points. These properties, which are analogous to properties of the Julia set of a rational function over the complex numbers, are due to Juan Rivera-Letelier. Independent proofs were recently found by Matt Baker and the speaker.

3) Continuation for Experts

Title: *The Berkovich Julia set and the equicontinuity locus.*

In classical dynamics, another characterization of the Julia set is as the "chaotic locus", the set of points at such that the iterates of the rational function are not equicontinuous on any neighborhood of the point. Rivera-Letelier has shown that for the Berkovich Julia set, this characterization holds over the p-adic complex numbers, but fails over an arbitrary complete, algebraically closed nonarchimedean field. We will give an exposition of this result.