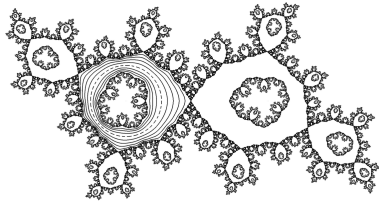


Dynamical Systems and Ergodic Theory

PhD degree at the Institute of Mathematics
of the University of Warsaw

Krzysztof Barański and Anna Zdunik



Dynamical systems

The theory of dynamical systems is an innovative and fast developing branch of mathematics which has its roots in the works of a famous mathematician and physicist Henri Poincaré and joins ideas emerging from physics (e.g. classical mechanics and statistical physics) and various branches of mathematics (e.g. differential equations, probability, complex analysis and geometric theory of measure). This fascinating field has attracted a number of top-level researchers, including many Fields medalists.

Dynamical systems in Warsaw

Research in dynamical systems in Warsaw has a long tradition. The **Warsaw Dynamical Systems Group**, founded in the early 1970s by Karol Krzyżewski and Wiesław Szlenk, is now active in four academic institutions in Warsaw:

- University of Warsaw,
- Institute of Mathematics of the Polish Academy of Sciences,
- Warsaw University of Technology,
- SGH Warsaw School of Economics.

Other former members of the group work now in several research centers in Europe, the United States and Canada.

Krzysztof Barański and Anna Zdunik both work at the Institute of Mathematics of the University of Warsaw.

PhD projects

We propose PhD projects which are close to our current research. This includes (but is not limited to) the following subjects:

- **Dynamics of entire and meromorphic functions in the plane**
Geometric and topological properties of invariant sets, invariant measures.
- **Random (real and complex) dynamics in one and several dimensions**
Behaviour of typical points, stability, ergodic and dimensional properties of stationary measures.
- **Questions arising from potential theory in the plane**
Harmonic measure on invariant domains for deterministic and random dynamics.
- **Dynamics of rational maps on the Riemann sphere**
Dimension properties of natural invariant sets.

PhD theses in Dynamical Systems written under our supervision in recent years

Michał Szostakiewicz (2012), advisor: A. Zdunik

Thermodynamic formalism for holomorphic endomorphisms of the complex projective spaces $\mathbb{C}P^k$, statistical properties of equilibrium states for Hölder continuous potentials, exponential mixing, Central Limit Theorem.

Łukasz Pawelec (2015), advisor: A. Zdunik

Quantitative aspects of Poincaré recurrence, asymptotics of successive closest returns and distribution of return times in deterministic and random setting, relation to the Hausdorff dimension of the phase space; dimension of indecomposable continua occurring in the dynamics of complex exponential maps.

PhD theses in Dynamical Systems written under our supervision in recent years

Julia Romanowska (2015), advisor: K. Barański

The Hausdorff dimension of the graph of the classical nowhere-differentiable Weierstrass function

$$f(x) = \sum_{n=0}^{\infty} a^n \cos(2\pi b^n x)$$

and its deterministic and random generalizations.

Adam Śpiewak (2020), advisor: K. Barański

Probabilistic aspects of the Takens embedding theorem, non-dynamical probabilistic embedding theorems; properties of stationary measures for random systems of homeomorphisms of the interval.

PhD theses in Dynamical Systems

written under our supervision in recent years

Krzysztof Lech (2021), advisor: A. Zdunik

Properties of Julia sets in random iteration of holomorphic functions, random iteration of the quadratic family, geometric properties and dimension of the equilibrium (harmonic) measure on random Julia sets, random and non-autonomous iteration of the exponential family.

Rafał Tryniecki (in progress), advisor: A. Zdunik

Hausdorff and packing measure of limit sets for conformal iterated function systems and conformal repellers, dependence on parameter and limit at infinity for sequences of finite systems converging to an infinite one, speed of convergence to the limit.



Welcome!