PhD research topic proposal
BME, Doctoral School of Mathematics and Computer Science

Name of supervisor :

> **Balázs Ráth**

Degree:

> **PhD**

Title of the topic:

> **Self-organized critical random graph models**

Short description:

> Random graphs (e.g. the Erdős-Rényi model) are the mathematical models of the connectivity phenomena observed in large complex networks (e.g., social networks, wold wide web, spreading of infections). The PhD candidate is invited to investigate a the dynamic random graph models defined in [Tóth, Ráth, 2009, EJP] and [Ráth, 2009, JSP] and further investigated in [Martin, Ráth, 2017, EJP]. One of these random graph models is the so-called "forest fire model", the time evolution of which is driven by two opposite effects: the creation of edges and the destruction of large connected components by "fires". The balance of these two effects drive the model to a "critical" state which is on the boundary of "safe" (subcritical) and "very inflammable" (supercritical) regimes. This phenomenon is called self-organized criticality (S.O.C.) by physicists. The mathematically rigorous theory of these S.O.C. random graph models still has plenty of interesting open questions suitable for a PhD student in mathematics.

Requirements:

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Contact:

Phone:

> ████████████████████

E-mail:

> █████████████████

Place of work:

> Department of Stochastics

Statement: *The conditions of the research above are satisfied, the theme is confirmed by the Head of the Department/Institute*