Title: *Fixed Parameter Tractability: an alternative approach to NP-hard problems*

Abstract: During the talk, I would like to give a short introduction to Fixed Parameter Tractability (FPT), a quite young and extremely dynamic branch of algorithmics. It is noteworthy that results in this field are very often influenced by the classical results of graph theory and discrete mathematics. After explaining the crucial notions of an FPT algorithm and a problem kernel on a very basic example of the Vertex Cover problem, we will proceed to more involved results, mostly based on recent work of our FPT group in Warsaw.

At first, we will show how to design FPT algorithms using the colour coding technique, which has strong relations with perfect hashing families. An example of an FPT algorithm for the Eulerian Edge Deletion problem will be discussed. This is a very recent result of joint work of our Warsaw group with Daniel Marx and Ildiko Schlotter.

Then, our attention will turn to so-called kernelization, particularly to kernelization hardness. We will discuss a powerful tool, called OR-distillation, which enables us to show nonexistence of polynomial kernels. Examples in this part will be based on our results on Connected Dominating Set in d-degenerate graphs.