V. Mitsou : Grundy distinguishes treewidth from pathwidth

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In this talk we are interested in the "price of generality" associated with the transition from pathwidth to treewidth. These two parameters have been very well studied and understood for decades now and, despite treewidth's generality over pathwidth, essentially all known problems seem to have the same complexity for both (recall that graphs of treewidth at most k form a strict superset of graphs of pathwidth at most k). So is there a price to pay when transitioning from pathwidth to treewidth, in other words, are there any problems which are FPT for graphs of bounded pathwidth but W-hard for graphs of bounded treewidth ? Our main goal in this talk will be to dive deeper into this question. We give the first natural example of a problem that is FPT parameterized by pathwidth but W[1]-hard parameterized by treewidth : Grundy Coloring.

Big part of this talk will be based on joint work with Rémy Belmonte, Eun Jung Kim, Michael Lampis, and Yota Otachi, SIAM Journal on Discrete Mathematics 2022, ESA 2020.

Full version available at https ://arxiv.org/abs/2008.07425.