MIS on graphs excluding induced substructures

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The complexity of the Maximum Independent Set problem is fully classified for graph classes defined by forbidden subgraphs or minors. It is polynomial-time solvable when excluding a forest in which every tree has at most three leaves as a subgraph, or when excluding a planar graph as a minor; in all other cases, it remains NP-hard. For graph classes defined by forbidden induced subgraphs or induced minors, however, the complexity landscape is largely unresolved. This talk presents some of the resolved cases ([1], [2]) and their connections to related problems.

References

[1] É. Bonnet, J. Duron, C. Geniet, S. Thomassé, A. Wesolek, Maximum Independent Set when excluding an induced minor: $K_1 + tK_2$ and $tC_3 \uplus C_4$, *ESA*, 2023 pp. 23:1–23:15.

[2] M. Bonamy, É. Bonnet, H. Déprés, L. Esperet, C. Geniet, C. Hilaire, S. Thomassé, A. Wesolek, Sparse graphs with bounded induced cycle packing number have logarithmic treewidth, *J. Comb. Theory Ser. B*, 2024 pp. 215-249.