

# VCU Discrete Mathematics Seminar

*Tree decompositions  
with bounded independence number  
and their algorithmic applications*

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Wednesday, Mar. 2

1:00-1:50

Zoom! @ <https://vcu.zoom.us/j/92975799914>  
password=graphs2357



The independence number of a tree decomposition  $\mathcal{T}$  of a graph is the smallest integer  $k$  such that each bag of  $\mathcal{T}$  induces a subgraph with independence number at most  $k$ . If a graph  $G$  is given together with a tree decomposition with bounded independence number, then the MAXIMUM WEIGHT INDEPENDENT SET (MWIS) problem can be solved in polynomial time. Using a variety of tools including SPQR trees and potential maximal cliques we show how to obtain tree decompositions efficiently in a variety of cases.

As an immediate consequence, we obtain that the MWIS problem can be solved in polynomial time in an infinite family of graph classes that properly contain the class of chordal graphs. More generally, our approach shows that the MAXIMUM WEIGHT INDEPENDENT  $\mathcal{H}$ -PACKING problem, a common generalization of the MWIS and the MAXIMUM WEIGHT INDUCED MATCHING problems, can be solved in polynomial time in these graph classes.

This is joint work with Clément Dallard and Kenny Štorgel.

For the DM seminar schedule, see:

<https://go.vcu.edu/discrete>