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**Title:** Total domination, transversals in hypergraphs and an FPT algorithm!

**Abstract:** A set  $S$  of vertices in a graph  $G$  is a total dominating set of  $G$  if every vertex of  $G$  is adjacent to some vertex in  $S$ . The minimum cardinality of a total dominating set is called the total domination number.

A transversal in a hypergraph,  $H = (V, E)$ , is a set of vertices  $T \subseteq V$ , such that every edge in  $E$  contains at least one vertex from  $T$ . We will both give bounds on the size of transversals in several kind of hypergraphs and show how these bounds can be used to obtain many different kind of bounds for the total domination number of a graph with properties such as (i) *minimum degree 3 or 4*, (ii) *2-connected*, (iii) *minimum degree 2, containing no induced 6-cycles* and (iv) *minimum degree 3, containing no 4-cycle*.

As finding transversals in 3-uniform hypergraphs (i.e. all edges contain 3 vertices) has many application, we will also mention a fixed parameter tractable algorithm for this problem. This algorithm can immediately be used in areas such as computational biology (related to phylogenetic trees) and tournaments (finding a minimum feedback vertex set). The time complexity of our algorithm beats all previously know algorithms.

We finally mention several open problems and conjectures.