

## The Signal Detection Problem: Closed Modular Colorings on Grid Graphs

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For a positive integer  $k$  and a connected graph  $G$ , let  $c : V(G) \rightarrow Z_k$  be a vertex coloring where adjacent vertices may be assigned the same color. Then  $c$  induces another vertex coloring  $c' : V(G) \rightarrow Z_k$  where  $c'(v)$  is the sum (modulo  $k$ ) of the original colors for vertex  $v$  and those vertices adjacent to  $v$ . The coloring  $c'$  is called a closed modular coloring of  $G$  if adjacent vertices are assigned different colors by  $c'$ . In this talk, the focus is on grid graphs (also known as lattice graphs or checkerboards) which have applications to cell-phone communication security – such as the signal detection problem. In addition, a computer technique for generating closed modular colorings of grid graphs is discussed.

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