

## The Hall spectrum of a graph can have non-consecutive zeros

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Hall's condition is necessary (though not sufficient) for a graph to admit a precoloring extension. A graph is Hall  $k$ -extendible if every  $k$ -precoloring satisfying Hall's condition is extendible to a  $k$ -coloring. It is known that every graph  $G$  is Hall  $k$ -extendible for all  $k \geq \Delta(G)$ . The Hall spectrum of a graph is a binary vector whose entries indicate the values of  $k$  for which the graph is Hall  $k$ -extendible. We discuss recent work on Hall spectrums and show that it is possible for the Hall spectrum of a graph to have non-consecutive zeros, thereby answering a question of Bobga, Goldwasser, Hilton, and Johnson posed in 2011. We also discuss new results on extending Hall precolorings with extra colors.

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