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*k*-vertex-critical graphs in  $(P_4 + \ell P_1)$ -free graphs

A graph  $G$  is  $k$ -vertex-critical if  $\chi(G) = k$  but  $\chi(G - v) < k$  for all  $v \in V(G)$ . In this presentation we make progress on the open problem of the finiteness of  $k$ -vertex-critical  $(P_4 + \ell P_1)$ -free graphs by showing that there are only finitely many  $k$ -vertex-critical  $(P_4 + \ell P_1, 2P_2)$ -free graphs,  $(P_4 + \ell P_1, \text{chair})$ -free graphs, and  $(P_4 + \ell P_1, P_5, \text{cricket})$ -free graphs for all  $k \geq 1$  and  $\ell \geq 0$ . Our results imply the existence of simple polynomial-time certifying algorithms to decide the  $k$ -colourability of all graphs in these subfamilies for every fixed  $k$ . This is joint work with Dr. Ben Cameron.