1011-05-107   **Henry Liu** and **Robert Morris*** (`rdmorris@memphis.edu`), Department of Mathematical Sciences, 373 Dunn Hall, The University of Memphis, Memphis, TN 38152, and **Noah Prince**. *Highly connected multicoloured subgraphs of multicoloured graphs.*

We consider the following question of Bollobás: given an r-colouring of $E(K_n)$, how large a k-connected subgraph can we find using at most s colours? We provide a partial solution to this problem when $s = 1$ (and n is not too small), showing that if $r - 1$ is a prime power then the answer lies between $\frac{n}{r-1} - 11(k^2 - k)r$ and $\frac{n-k+1}{r-1} + r$. The case $k = 1$ was originally proved independently by Füredi and by Gyárfás, and we give a short proof of their result. We also determine the answer exactly when $r = 2$ or 3. When $s > 1$ the problem seems harder, but we have proved fairly tight bounds when $s = 2$ and $r + 1$ is a power of 2, and discovered phase transitions in the function at $s = \Theta(\sqrt{r})$ and $2s = r$. We have many open problems, and I shall mention some of the most glaring of these. This is joint work with Henry Liu and Noah Prince. (Received August 19, 2005)

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