Lale Ozkahya* (ozkahya@iastate.edu) and Yury Person (person@informatik.hu-berlin.de). Minimum $H$-decompositions of graphs: edge-critical case.

For a given graph $H$, let $\phi_H(n)$ be the maximum number of parts that are needed to partition the edge set of any graph on $n$ vertices such that every member of the partition is either an edge or it is isomorphic to $H$. Bollobás showed that when $H = K_r$, $r \geq 3$, $\phi_H(n)$ is equal to $t_{r-1}(n)$, the size of the $(r-1)$-partite Turán graph. Pikhurko and Sousa extended this result to any graph $H$, with chromatic number $\chi(H) = r \geq 3$, and proved that $\phi_H(n)$ is at most $t_{r-1}(n) + o(n^2)$. Pikhurko and Sousa conjectured that $\phi_H(n) = \text{ex}(n,H)$ when $\chi(H) \geq 3$ and $n$ is sufficiently large, where $\text{ex}(n,H)$ denotes the maximum size of a graph on $n$ vertices that does not contain $H$ as a subgraph. We verify their conjecture for any edge-critical graph $H$ and show that the graphs maximizing $\phi_H(n)$ for such $H$ are $(\chi(H) - 1)$-partite Turán graphs. This is joint work with Yury Person. (Received September 12, 2010)