1089-05-86 **Alexandr Kostochka***, kostochk@math.uiuc.edu, Urbana, IL 61801, and **Matthew Yancey**.
Extremal graphs for Gallai's Conjecture on the minimum size of k-critical n-vertex graphs. Preliminary report.

A graph G is k-critical if the chromatic number of G is k, but the chromatic number of every its proper subgraph is less than k. In particular, every graph with chromatic number k contains a k-critical subgraph. Dirac in 1957 posed the problem of finding the minimum number of edges, $f_k(n)$, in an n-vertex k-critical graph. It is well known that $f_3(n) = n$ for all odd $n \geq 3$, but for $k \geq 4$, the values of $f_k(n)$ were known only for small n. Gallai in 1963 conjectured that $f_k(n) = \frac{(k+1)(k-2)n-k(k-3)}{2(k-1)}$ for each $k \geq 4$ and $n \equiv 1 \mod (k-1)$, $n \geq k$. Very recently, the authors proved this conjecture and determined the values of $f_4(n)$ for every $n \geq 6$. The aim of the talk is to prove a Brooks-type result: We describe all k-critical n-vertex graphs with exactly $\frac{(k+1)(k-2)n-k(k-3)}{2(k-1)}$ edges. As a corollary we determine the values of $f_5(n)$ for every $n \geq 7$. (Received February 03, 2013)