1067-90-809 **Gianpaolo Oriolo*** (oriolo@disp.uniroma2.it), Universita' di Roma Tor Vergata, Dipartimento Ingegneria dell'Impresa, via del Politecnico, 1, 00133 Roma, Italy, and **Yuri Faenza** and **Gautier Stauffer**. *An $O(n^3)$ algorithm for the weighted stable set problem on claw-free graphs.*

The maximum weighted stable set problem (MWSS) on a claw-free graphs is a generalization of the weighted matching problem. Sbihi and later Lovász and Plummer gave algorithms for the cardinality case of MWSS, while Minty solved the weighted version. The Minty algorithm was revised by Nakamura and Tamura and later simplified by Schrijver and can be implemented to run in time $O(n^6)$.

A deep decomposition theorem for claw-free graphs was recently introduced by Chudnovsky and Seymour. Later, Oriolo, Pietropaoli and Stauffer proposed a new approach to solve MWSS on graphs that admit a suitable decomposition. Unfortunately, it is not known any polytime algorithm to get the decomposition by Chudnovsky and Seymour.

In this talk, we show a new decomposition theorem for claw-free graphs and a $O(n^3)$ algorithm to obtain the decomposition. Our theorem is inspired by that by Chudnovsky and Seymour, but it is a stand-alone result that, even if much less detailed, is particularly useful for the MWSS problem. In fact, building upon a few other results from the literature, we show that we can solve the MWSS in claw-free graphs in $O(n^3)$ time, drastically improving upon previous known algorithms. Our algorithm also "provides" a pretty simple extended formulation for the problem. (Received September 15, 2010)