Dear colleagues,

We are glad to invite you to join us for **celebrating** the **85th** anniversary of **Jack Edmonds !**

What better idea than a seminar on "Complexity and Combinatorial Optimization" with **Jack** and other great speakers!

The seminar will take place at Paris1 Panthéon-Sorbonne University, 17 place de la Sorbonne:

Amphitheater Richelieu

on **May 3 rd**, 2019 from 2pm to 6:30 pm.

For security reasons, we must provide to the security service the complete list of people registered.
They will check each participant name with identity card.

Registration is free but necessary to access inside the Sorbonne.
Please register by sending an email to: sonia.vanier@univ-paris1.fr

Registrations will be closed on April 29.

The Program:

2pm – 3 pm: **Jack Edmonds** *God provides only a few glimpses of heaven.*

3pm- 4pm Laurence Wolsey: *A Somewhat New Look at Benders' Algorithm*

Abstract: Traditionally Benders' algorithm is applied to solve problems of the form min$\{cx+hy : Fx+Gy \geq b, x \in Z^n_+, y \in R^p_+\}$, denoted (BP), by breaking the problem into a Master mixed-integer problem in the (x, η)-variables and a linear programming Subproblem in the y-variables, each of which has to be solved many times. This approach is of interest in cases in which p >> n or the subproblem has special structure, such as separability, that can be exploited. A natural extension that has received considerable attentions is the case in which some or all of the y-variables are also integer, denoted (BIP). In this case the subproblem is also a mixed-integer program. Note that modern implementations of Benders' use branch-and-cut so that the Master MIPs are replaced by a series of LPs. We examine two different aspects:

1). For BP with $y \in R^p_+$, we show how, by a simple reformulation and an appropriate normalization, infeasibility cuts can be obtained that are almost surely facet-defining for $P = \{x \in R^n_+ : \exists\, y \in R^p_+ \text{ with } Fx + Gy \geq b\}$. This was joint work with Michele Conforti.
2). For BIP, in which the subproblems are MIPs, all the algorithms of which we are aware call for the repeated solution of the MIP subproblem. We present a branch-and-cut algorithm in which the subproblems are also just LPs. This is joint work with Dieter Weninger.

4pm – 5pm: Coffee Breack

5pm– 5:25 Ivana Ljubic : *Solving Very Large Scale Covering Location Problems using Branch-and-Benders-Cut*

Abstract: In this talk we address the maximal covering location problem (MCLP) which requires choosing a subset of facilities that maximize the demand covered while respecting a budget constraint on the cost of the facilities and the partial set covering location problem (PSCLP) which minimizes the cost of the open facilities while forcing a certain amount of demand to be covered. We propose an effective decomposition approach based on the branch-and-Benders-cut reformulation.
The results of our computational study demonstrate that, thanks to this decomposition technique, optimal solutions can be found very quickly, even for benchmark instances involving up to twenty million demand points.

The talk is based on the paper: J.F. Cordeau, F. Furini, I. Ljubic: Benders Decomposition for Very Large Scale Partial Set Covering and Maximal Covering Problems, European Journal of Operational Research 275(3):882-896, 2019

5:25 – 5:50: Bissan Ghaddar *"A global optimization approach for binary polynomial programs"*

Abstract: In this talk, we present branch-and-dig, an algorithm to find global solutions for binary polynomial programming problems. Inequality generating techniques based on lift-and-project relaxations are developed to speed up the branch-and-bound process and reduce the number of nodes of the tree. Computational results for problems of degree two and degree three are provided to assess the the impact of the proposed approach.

5:50 – 6:15 Viet Hung Nguyen: *A Benders decomposition method for the signal-optimization problem in traffic light*. Authors: M. Minoux, M.T. Ngo, and V.H. Nguyen

Abstract: Given a traffic network with specified demands in the entries and directional distributions in each intersection, we consider the signal-optimization problem which tries to find the best offset values and sequences of ``green/red" in each signal cycle minimizing the total traffic delay of all vehicles in network over a given time T.
In this talk, we propose a MIP formulation of the problem based on a first order macroscopic traffic simulation model (CTM model).
We show that the MIP can solved efficiently by a Benders decomposition based method in which Benders optimality cuts can be generated by a very fast combinatorial way.

We are looking forward welcoming you at the Sorbonne!

Bests Regards,

Ivana Ljubic (ESSEC) and Sonia Vanier (SAMM Paris1 et Groupe de travail Optimisation des Réseaux du GDR-RO)