The core component of our scientific agenda focuses on the development of statistical and probabilistic methods for the modeling and the optimization of complex systems. These systems require mathematical representations which are in essence dynamic and stochastic with discrete and/or continuous variables. This increasing complexity poses genuine scientific challenges that can be addressed through complementary approaches and methodologies:

- Modeling: design and analysis of realistic and tractable models for such complex real-life systems taking into account various probabilistic phenomena
- Estimation and evaluation: developing theoretical and computational methods in order to estimate the parameters of the model and to evaluate the performance of the system
- Optimal Control: developing theoretical and numerical control tools to optimize the performance

Contexte et atouts du poste

The project focuses on dynamic resource allocation problems (e.g., bandit problem) both in discrete and continuous time. Typically, the problem consists in optimizing the functioning of parallel systems whose evolution is random (Markovian) and dependent on the decisions taken by a central or distributed controller.

Classically, the controller is central and has complete information, in which case it has been shown in the literature that this optimization problem can be explicitly solved by introducing the notion of Gittins index.

In contrast, this thesis will focus on distributed controllers having partial observations. In this context, optimal solutions of this optimization problem cannot be written in an explicit form and it is then necessary to develop approximation methods in order to provide feasible solutions. The objective of this thesis is to work in this framework and to propose and study such techniques.
References:
1) P. Robert, Stochastic Networks and Queues, New York: Springer-Verlag, 2003

Compétences
Required knowledge and background: The highly motivated candidate must have a master degree in mathematics with a strong background in applied probability.

Avantages sociaux
- Subsidised catering service
- Partially-reimbursed public transport

Rémunération
1982€ / month (before taxa) during the first 2 years, 2085€ / month (before taxa) during the third year.