Bonjour à tous,

Voici ci-dessous le programme de la journée SYNOBS du 21 avril !

Elle aura lieu

Salle 11B0 au CNAM, 292 rue Saint-Martin, 75003 Paris.

de **10h à 16h30** environ.

Pour avoir une idée du nombre de participants, pourriez vous vous inscrire sur le lien ci-dessous ?

https://doodle.com/meeting/participate/id/b821DYLe

Encore merci aux orateurs, cette journée s'annonce très intéressante !

Amitiés

Pauline

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- 10h – 11h : **Alain Rapaport** : *A propos d'estimation d'ensembliste de courbes de croissance pour la prédiction robuste de la dynamique de bioprocédés*

Les observateurs par intervalles utilisent une information a priori sous forme d'encadrements garantis des incertitudes. Dans ce travail, nous adressons le problème de la détermination d'encadrements fonctionnels de courbes de croissance à partir de données expérimentales, qui sont alors utilisés pour la prédiction robuste de l'évolution de bioprocédés continus ou batch à l'aide d'observateurs par intervalles

- 11h – 11h45 : **Elena Petri** : *Towards improving the estimation performance of a given nonlinear observer: a multi-observer approach*

Various methods are nowadays available to design observers for broad classes of systems, however the question of the tuning of the observer to achieve satisfactory estimation performance remains largely open. In this work we assume that a robust nominal observer has been designed for a general nonlinear system and the goal is to improve its performance. We present for this purpose a novel hybrid multi-observer, which consists of the nominal one and additional dynamical systems that differ from the nominal observer only in their output injection gains, that are collectively referred to as modes. We then evaluate the estimation cost of each mode of the multi-observer and, based on these costs, we select one of them at each time instant. Different strategies are proposed to reset, or not, the modes which are not selected at each switching instant. We prove a convergence property for the hybrid estimation scheme and we illustrate the efficiency of the approach in improving the performance of a given nominal high-gain observer on a numerical example.

- 11h45 – 12h30 **: Mona Buisson-Fenet** : *Towards gain tuning for numerical KKL observers*

This paper presents a first step towards tuning observers for nonlinear systems. Relying on recent results around Kazantzis-Kravaris/Luenberger (KKL) observers, we propose to design a family of observers parametrized by the cut- off frequency of a linear filter. We use neural networks to learn the mapping between the observer and the nonlinear system as a function of this frequency, and present a novel method to sample the state-space efficiently for nonlinear regression. We then propose a criterion related to noise sensitivity, which can be used to tune the observer by choosing the most appropriate frequency. We illustrate the merits of this approach in numerical simulations

- 14h – 15h : **Hassan Hammouri** : *Forme normale d'observabilité : Approche sous-analytique*

Dans le cas mono-sortie, il est classique de transformer les systèmes uniformément observables sous la forme canonique d'observabilité et ceci localement presque partout. Quand il s'agit de leur transformation d'une façon globale, on se heurte au problème des singularités. Dans cet exposé, nous allons donner une analyse globale de cette transformation en utilisant l'approche de la géométrie sous-analytique.

- 15h – 15h45 : **Lucas Brivadis** : *Online estimation of Hilbert-Schmidt operators and application to kernel reconstruction of neural fields*

In this presentation, we introduce an adaptive observer for online estimation of Hilbert-Schmidt operators from online measurement of the state for some class of nonlinear infinite-dimensional dynamical systems. Convergence is ensured under detectability and persistency of excitation assumptions. The problem is motivated by an application to kernel reconstruction of neural fields, commonly used to model spatiotemporal activity of neuronal populations.

- 15h45 – 16h30 : **Mathieu Marchand** : *Distributed Event-Triggered Leader-Follower Consensus of Nonlinear Multi-Agent Systems*

We consider the distributed leader-follower consensus problem with event-triggered communications. The system under consideration is a non-linear input affine multi agent system. The agents are assumed to have identical dynamics structure with uncertain parameters and satisfies an incremental stabilizability condition. A distributed control law is proposed which achieves consensus based on three novel Communication Triggering Conditions (CTCs): the first one when the leader's communications are not restricted, the second when the leader is also subject to a communication triggering mechanism and, finally, the last one to exclude Zeno behaviour