Title: Reachable spaces for heat equations with lower order terms

Abstract: The goal of this talk is to explain how perturbative arguments can be applied to derive a sharp description of the reachable space for heat equations having lower order terms. The main result I will present is the following one. Let us consider an abstract system $y' = Ay + Bu$, where A is an operator generating a C^0 semigroup $(\exp(tA))_{t\geq 0}$ on a Hilbert space X, and B is a control operator, for instance a linear operator from an Hilbert space U to X, and let us assume that this system is null-controllable in X in any positive time. Then, setting $\mathcal{R}$ for the reachable set of the system (that is all the states that can be achieved by y solution of $y' = Ay + Bu$, $y(0) = 0$), the restriction of $(\exp(tA))_{t\geq 0}$ to $\mathcal{R}$ forms a C^0 semigroup on $\mathcal{R}$. Accordingly, the system $y' = Ay + Bu$,is exactly controllable on $\mathcal{R}$, and one can then perform classical perturbative arguments to handle lower order terms, as I will explain on a few examples. This talk is based on a joint work with Kévin Le Balc'h (INRIA Paris) and Marius Tucsnak (Bordeaux).