LIASFMA
International Graduate School on Applied Mathematics
November- December 2021

Course 2: Mathematical methods for modeling and control of open quantum systems

Lecturer: Pierre Rouchon (MINES ParisTech & INRIA, France)

Abstract: Quantum control is an emerging research subject with an increasing role in technologies related to high precision metrology, quantum simulation, quantum information processing and communication. Its development requires to reconsider how measurement, control, and interactions fundamentally affect a system in particular, the intrinsic invasive character of measurements. This course presents mathematical methods developed for modeling and stabilizing open quantum systems and for protection against decoherence (dissipation of quantum information through the coupling of the system to its uncontrolled environment). These methods will be illustrated by experiments in cavity quantum electrodynamics and for quantum super-conducting circuits. The level will be that of a graduate course intended for a general control or applied-mathematics audience without any prerequisites in quantum mechanics.

Biography

Pierre Rouchon is professor with the Centre Automatique et Systèmes, Mines-ParisTech, Université PSL. He graduated from Ecole Polytechnique in 1983, has obtained a PhD in 1990 and an "habilitation à diriger des recherches" in 2000. From 1993 to 2005, he was associated professor at Ecole Polytechnique in Applied Mathematics. From 1998 to 2002, he was the head of the "Centre Automatique et Systèmes". From 2007 to 2018, he was the chair of the department "Mathématiques et Systèmes" at Mines-ParisTech. Since 2015, he is a member of the Quantic Research team with Inria and Ecole Normale Supérieure de Paris. His fields of interest include nonlinear control and system theory with applications to physical systems. His contributions include differential flatness and its extension to infinite dimensional systems, non-linear observers and symmetries, quantum filtering and feedback control. In 2017, he received the "Grand Prix IMT - Académie des sciences de Paris".

Schedule of Course 2				
	Lecture 1	Lecture 2	Lecture 3	Lecture 4
Date	Tuesday Nov. 30	Thursday Dec. 2	Tuesday Dec. 7	Thursday Dec. 9
Time	1 pm-3 pm Paris time (8 pm-10 pm Beijing time)			
Zoom ID	91462968711	95084818544	93368862796	96815316470
Passcode	776300	344184	670773	701872
Zoom Link	Link1	Link2	Link3	Link4