

Are infinite-dimensional closed quantum systems generically controllable?

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Abstract: It is well-known that bilinear control systems of the form

$$\dot{X}(t) = (u_1(t)B_1 + u_2(t)B_2)X(t), \quad X(0) = I_n \quad (1)$$

are generically controllable on semi-simple Lie groups like $SL_n(\mathbb{R})$ or $SL_n(\mathbb{C})$. Loosely speaking, this means that for a randomly chosen tuple (B_1, B_2) system (1) will be controllable. This readily implies generic controllability for finite-dimensional closed quantum systems of the form

$$\dot{U}(t) = -i(H + u_1(t)H_1)U(t), \quad U(0) = I_n. \quad (2)$$

But what about infinite-dimensional quantum systems? – Of course, solving this question in full generality is currently out of (our) reach. Therefore, in this talk we will focus on a certain “natural” and rather large class of systems which often occurs in applications. Within this subclass we prove that the answer to the above raised question is “yes”.