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Local controllability of a Bose–Einstein condensate in a time-varying box

In this talk we consider the "condensate-in-time-varying-box" problem in one space dimension,

$$i\mathbf{u}_t = -\mathbf{u}_{xx} - |\mathbf{u}|^2\mathbf{u} \tag{1a}$$

$$\mathbf{u}(t,0) = \mathbf{u}\big(t, L(t)\big) = 0. \tag{1b}$$

Taking the length, $L(t)$, of the box to be the control, we show that (1a), (1b) is controllable in the vicinity of the nonlinear ground state.

This is joint work with Karine Beauchard (Cachan) and Horst Lange (Cologne).