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On the existence of prescribed L^2 norm solutions for nonlinear Schrödinger equations on metric graphs: the mass supercritical case

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In this talk we discuss the existence of prescribed L^2 norm solutions to nonlinear Schrödinger equations set on metric graphs. A common strategy employed to find such a solution is to search for a constrained critical point of the associated energy functional. Some geometric properties of the functional vary depending on the exponent in the nonlinear term of the equation. In the so-called mass subcritical case, the functional is bounded from below and coercive on the constraint, so one may search for a critical point as a global minimum. As such, in the last years, this case has been extensively studied.

However, in the complementary case, known as the mass supercritical case, the energy functional is no longer bounded from below on the constraint and presents a lack of a priori bounds on the possible critical points. As a result, very little is yet known about this case. Through the presentation of some of the few existing results, we shall discuss the main obstacles that need to be overcome to treat this case under general assumptions. We will also present some of the tools that have already been developed for this purpose.

This talk is based on some joint works with J. Borthwick (Besancon), X. Chang (Changchun) and N. Soave (Torino).

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