UNIVERSITÀ DEGLI STUDI DI BARI ALDO MORO

DIPARTIMENTO DI MATEMATICA

Seminari di Matematica

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Orbital stability of ground states to Schrödinger equations with mass constraints

Dott. Jacopo Schino
North Carolina State University

Abstract

We discuss the existence of standing waves solutions to

$$\mathrm{i}\partial_t \Phi - \Delta \Phi = F'(\Phi),$$

i.e., $\Phi(t,x) = e^{-\mathrm{i}\lambda t}u(x)$. Since the mass $\int_{\mathbb{R}^N} |\Phi(t,x)|^2 \,\mathrm{d}x$ and the energy $\int_{\mathbb{R}^N} \frac{1}{2}|\nabla \Phi(t,x)|^2 - F(\Phi(t,x)) \,\mathrm{d}x$ are conserved in time if $F(\Phi) = F(|\Phi|)$, such standing waves are sought as *normalised solutions*, i.e., solving

$$\begin{cases} -\Delta u + \lambda u = F'(u) \\ (\lambda, u) \in \mathbb{R} \times H^1(\mathbb{R}^N) \\ \int_{\mathbb{R}^N} |u|^2 \,\mathrm{d}x = a^2 \end{cases}$$

for some prescribed $a > 0$, where λ is part of the unknown. We show that when the energy is bounded below over the set $\{u \in H^1(\mathbb{R}^N) : \|u\|_{L^2(\mathbb{R}^N)} \leq a\}$ and its infimum is negative, the set of ground state solutions to the elliptic problem above is orbitally stable.

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