# Normalized ground states of the nonlinear Schrödinger equation with at least mass critical growth

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**Abstract**

We propose a simple minimization method to show the existence of least energy solutions to the normalized problem

$$\begin{cases} -\Delta u + \lambda u = g(u) \quad \text{in } \mathbb{R}^N,\ N \geq 3, \\ u \in H^1(\mathbb{R}^N), \\ \int_{\mathbb{R}^N} |u|^2 \, dx = \rho > 0, \end{cases}$$

where $\rho$ is prescribed and $(\lambda, u) \in \mathbb{R} \times H^1(\mathbb{R}^N)$ is to be determined. The new approach based on the direct minimization of the energy functional on the linear combination of Nehari and Pohozaev constraints intersected with the closed ball in $L^2(\mathbb{R}^N)$ of radius $\rho$ is demonstrated, which allows to provide general growth assumptions imposed on $g$. We cover the most known physical examples and nonlinearities with growth considered in the literature so far as well as we admit the mass critical growth at 0.

This is a joint work with J. Mederski.