

Abstract:

In this talk I intend to give a panoramic view on existence results for fully nontrivial solutions of the weakly coupled cubic nonlinear Schrödinger system

$$\begin{aligned} & \end{aligned}$$

$$-\Delta u + \omega u = u^3 + buv^2 \quad \text{in } \mathbb{R}^n, \quad$$

$$-\Delta v + \omega v = v^3 + bv^2 u \quad \text{in } \mathbb{R}^n, \quad$$

$$u, v \in H^1(\mathbb{R}^n), \quad n \in \{1, 2, 3\}, \quad \omega > 0, b \in \mathbb{R}$$

$$\end{aligned}$$

which have been obtained during the past ten years.

The focus will be set on a comparison of the methods coming from bifurcation

theory and constrained minimization techniques respectively critical point theory. Amongst other things

I will show that in case $n \in \{2, 3\}$ positive solutions exist and converge to a solution of some optimal

partition problem as the coupling parameter b tends to $-\infty$ whereas this phenomenon does not occur

when $n=1$.