

# Minimal energy solutions for repulsive nonlinear Schrödinger systems

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We establish existence and nonexistence results concerning fully nontrivial minimal energy solutions of the nonlinear Schrödinger system

$$\begin{aligned} -\Delta u + u &= |u|^{2q-2}u + b|u|^{q-2}u|v|^q && \text{in } \mathbb{R}^n, \\ -\Delta v + \omega^2 v &= |v|^{2q-2}v + b|u|^q|v|^{q-2}v && \text{in } \mathbb{R}^n \end{aligned}$$

in the repulsive case  $b < 0$ . Here, we assume that the exponent  $q$  satisfies  $1 < q < \frac{n}{n-2}$  in case  $n \geq 3$  and  $1 < q < \infty$  in case  $n = 1$  or  $n = 2$ . For space dimensions  $n \geq 2$  and arbitrary  $b < 0$  we prove the existence of fully nontrivial nonnegative solutions which converge to a solution of some optimal partition problem as  $b \rightarrow -\infty$ . In case  $n = 1$  we prove that minimal energy solutions exist provided the coupling parameter  $b$  has small absolute value whereas fully nontrivial solutions do not exist if  $1 < q \leq 2$  and  $b$  has large absolute value. This generalizes the existence results found in [1].

## References

- [1] *B. Sirakov*: Least energy solitary waves for a system of nonlinear Schrödinger equations in  $\mathbb{R}^n$ . *Commun. Math. Phys.* *271* (2007), 199–221.
- [2] *R. Mandel*: Minimal energy solutions for repulsive nonlinear Schrödinger systems, <http://arxiv.org/abs/1303.4521>.