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Minimization problem associated with ground states to combined power-type nonlinear Schrödinger equations

In this talk, we consider a minimization problem associated to ground state solutions to the following scalar field equation

$$-\Delta u + \omega u - |u|^{p-1}u - |u|^4 u = 0 \qquad \text{in } \mathbb{R}^3, \tag{1}$$

where $\omega > 0$ and $1 < p < 5$.

we shall show that the minimization problem has no minimizer when $\omega \gg 1$ and $1 < p \leq 3$. In addition, we determine an explicit frequency threshold that classifies the existence and non-existence.

To prove our results, we employ a resolvent expansion as in Coles and Gustafson (preprint). The resolvent expansion has a singularity because of a resonance in three space dimensions. The frequency threshold appears thanks to the presence of this singularity.

This talk is based on a joint work with T. Akahori(Shizuoka), S. Ibrahim (Victoria) and H. Nawa (Meiji)