Nonlinear Schrödinger equations with sum of periodic and vanishig potentials and sign-changning nonlinearities

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We look for ground state solutions to the following nonlinear Schrödinger equation

$$-\Delta u + V(x)u = f(x,u) - \Gamma(x)|u|^{q-2}u \text{ on } \mathbb{R}^N,$$

where $V = V_{per} + V_{loc} \in L^\infty(\mathbb{R}^N)$ is the sum of a periodic potential V_{per} and a localized potential V_{loc}, $\Gamma \in L^\infty(\mathbb{R}^N)$ is periodic and $\Gamma(x) \geq 0$ for a.e. $x \in \mathbb{R}^N$ and $2 \leq q < 2^*$. We assume that $\inf \sigma(-\Delta + V) > 0$, where $\sigma(-\Delta + V)$ stands for the spectrum of $-\Delta + V$ and f has the subcritical growth but higher than $\Gamma(x)|u|^{q-2}u$, however the nonlinearity $f(x,u) - \Gamma(x)|u|^{q-2}u$ may change sing. Although a Nehari-type monotonicity condition for the nonlinearity is not satisfied we investigate the existence of ground state solutions being minimizers on the Nehari manifold.

Joint work with Jarosław Mederski (Nicolaus Copernicus University).

References

[1] B. Bieganowski, J. Mederski: *Nonlinear Schrödinger equations with sum of periodic and vanishig potentials and sign-changning nonlinearities*, arXiv:1602.05078