Multiplicity of solutions for Schrödinger equation with sign-changing nonlinearity

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We are going to show the existence of multiple solutions of Schrödinger equation

$$-\Delta u + V(x)u = f(u) - \lambda g(u) \tag{1}$$

where $u : \mathbb{R}^N \to \mathbb{R}$ and V is periodic with respect to $x \in \mathbb{R}^N$ (i.e. is symmetric under the action of $\mathbb{Z}^N$). This equation doesn't fit the assumptions of the famous paper [2], especially due to the change of the sign of the right-hand side.

The existence result for equation (1) was proven in [1]. We prove the theorem providing the existence of multiple critical points of the abstract functional in the way that the variational functional of equation (1) fits to it. During the talk we will show the idea of proving multiplicity results introduced in [2] and the modifications needed in this approach to cover a study of equation (1).

Join work in progress with Bartosz Bieganowski and Federico Bernini.

References

[1] F. Bernini, B. Bieganowski: *Generalized linking-type theorem with applications to strongly indefinite problems with sign-changing nonlinearities*, Calc. Var. **61**(182), (2022).

[2] W. Kryszewski, A. Szulkin: *Generalized linking theorem with an application to a semilinear Schrödinger equation*, Adv. Differential Equations **3** (1998), no.3, p. 441–472.