Multiplicity result for strongly-indefinite symmetric functionals

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The starting point of the talk is the 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.

During the talk we present the abstract multiplicity theorem for functionals defined on spaces with special group action (so-called dislocation spaces) such that the functional is invariant (or symmetric) under this action. The idea of the proof is based on the paper [2]. The $H^1(\mathbb{R}^N)$ with $\mathbb{Z}^N$-translations and variational functional of the equation (1) is the example where the abstract theorem will be applied.

This is join work in with Bartosz Bieganowski and Federico Bernini as the continuation of the paper [1] where the authors provide the existence result for the problem (1) and now we got a multiple solutions.

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.