Singular quasilinear critical Schrödinger equations in $\mathbb{R}^N$

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Abstract

In this talk we discuss some recent results concerning singular quasilinear Schrödinger problems in the entire $\mathbb{R}^N$ with a nonlinearity involving both a critical term and a subcritical term, nonnegative nontrivial weights and positive real parameters λ, β, covering several physical models coming from plasma physics as well as high-power ultra short laser in matter. In particular, under suitable conditions on the exponents of the nonlinearity, we obtain multiplicity results with negative and positive energy depending on the range of the parameters λ, β, overcaming the double loss of compactness due both to the critical Sobolev's exponent p^* and to the unboundedness of the domain. We analyze also the case of nonnegative nontrivial weights satisfying some symmetry conditions with respect to a certain group $T \subset O(N)$, where $O(N)$ is the group of orthogonal linear transformations in $\mathbb{R}^N$. Our proofs relay on variational tools, including concentration compactness principles because of the delicate situation of the double lack of compactness. In addition, a necessary reformulation of the original problem in a suitable variational setting produces a singular function, delicate to be managed.