Optimal Liouville-type theorems for noncooperative elliptic Schrödinger systems and applications

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We study multi-component elliptic Schrödinger systems arising in nonlinear optics and Bose-Einstein condensation phenomena. We prove new Liouville-type nonexistence theorems, as well as a priori bounds, decay and singularity estimates. This is shown under an optimal Sobolev growth restriction on the nonlinearities, thus improving on recent results of Dancer et al. and of Tavares et al. These systems are of non-cooperative form and hence cannot be tackled by maximum principle methods such as moving planes. Instead we rely on a delicate combination of Rellich-Pohozaev type identities, Sobolev and interpolation inequalities on S^{n-1} and feedback and measure arguments. We also extend our results to a rather general class of gradient-type systems.

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