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Constrained Schrödinger-Poisson system with non constant interaction

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We are dealing with a Schrödinger-Maxwell system in a bounded domain of $\mathbb{R}^3$; the unknowns are the charged standing waves $\psi = e^{-i\omega t}u(x)$ in equilibrium with a purely electrostatic potential ϕ. The system is not autonomous, in the sense that the coupling depends on a function $q = q(x)$. The non-homogeneous Neumann boundary conditions on ϕ prescribe the flux of the electric field $\Im$ and give rise to a necessary condition. On the other hand we consider the usual normalizing condition in L^2 for u.

Under mild assumptions involving $\Im$ and the function $q = q(x)$, we prove that this problem has a variational framework: its solutions can be characterized as constrained critical points. Then, by means of the Ljusternick-Schnirelmann theory, we get the existence of infinitely many solutions.

This work is in collaboration with Lorenzo Pisani.

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