A semilinear Schrödinger equation in the presence of a magnetic field

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We consider the semilinear stationary Schrödinger equation in a magnetic field $(-i\nabla + A)^2 u + V(x)u = g(x, |u|)u$ in $\mathbb{R}^N$, where V is the scalar (or electric) potential and A is the vector (or magnetic) potential. We study the existence of nontrivial solutions both in the critical and in the subcritical case (respectively $g(x, |u|) = |u|^{2^*-2}$ and $|g(x, |u|)| \leq c(1 + |u|^{p-2})$, where $2 < p < 2^*$). The results are obtained by variational methods. For g critical we use constrained minimization and for subcritical g we employ a minimax-type argument. In the latter case we also study the existence of infinitely many geometrically distinct solutions.