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A concentration phenomenon for a semilinear elliptic equation

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We consider the problem

$$-\Delta u + V(x)u = Q(x)|u|^{p-2}u, \quad x \in \Omega,\ u \in H_0^1(\Omega),$$

where $\Omega \subset \mathbb{R}^N$ is a domain containing the origin, $2 < p < 2^*$, V is bounded, $V \geq 0$ and $\sigma(-\Delta + V) \subset (0, \infty)$. Further, we assume that Q is bounded, positive on a small ball centered at the origin and negative outside a slightly larger ball. We show that the solutions of this problem concentrate at the origin as the size of the ball tends to 0. We also consider the same problem with Q positive on two spots of small size and show that ground state solutions concentrate at one of these spots.

This is joint work with Nils Ackermann.

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