Concentration on curves for nonlinear Schrodinger eqautions

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Abstract

We consider the problem

$$\epsilon^2 \Delta u - V(x)u + u^p = 0, \ u > 0, \quad u \in H^1(R^2)$$

where $p > 1$, $\epsilon > 0$ is a small parameter and V is a uniformly positive, smooth potential. Let Γ be a closed curve, non-degenerate geodesic relative to the weighted arclenght $\int_\Gamma V^\sigma$, where $\sigma = \frac{p+1}{p-1} - \frac{1}{2}$. We prove the existence of a solution u_ϵ concentrating along the whole of Γ, exponentially small in ϵ at any positive distance from it, provided that ϵ is small and satisfies some Gap Condition. In particular this establishes the validity of a conjecture raised by Ambrosetti-Malchiodi-Ni (2003) in the two-dimensional case.
(Joint work with M. del Pino and M. Kolwalczyk.)