SOLUTIONS OF SCHRÖDINGER EQUATIONS WITH SYMMETRY IN ORIENTATION PRESERVING TETRAHEDRAL GROUP

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In this talk, we consider the nonlinear Schrödinger equation

$$\Delta u = \big(1 + \varepsilon V_1(|y|)\big)u - |u|^{p-1}u \quad \text{in} \quad \mathbb{R}^N, \quad N \geq 3, \quad p \in \left(1, \frac{N+2}{N-2}\right).$$

The phenomenon of pattern formation has been a central theme in the study of nonlinear Schrödinger equations. However, the following nonexistence of $O(N)$ symmetry breaking solution is well-known: if the potential function is radial and radially nondecreasing, any positive solution must be radial. Therefore, solutions of interesting patterns, such as those with symmetry in a discrete subgroup of $O(N)$, can only exist after violating the assumptions. For a potential function that is radial but asymptotically decreasing, a solution with symmetry merely in a discrete subgroup of $O(2)$ has been presented. These observations pose the question of whether patterns of higher dimensions can appear. In this talk, the existence of nonradial solutions whose symmetry group is a discrete subgroup of $O(3)$, more precisely, the orientation-preserving regular tetrahedral group is shown.

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