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Schrödinger Equation on Homogeneous Trees

Let \mathbb{T} be a homogeneous tree and \mathcal{L} the Laplace operator on \mathbb{T} . We consider the semilinear Schrödinger equation associated to \mathcal{L} with a power-like nonlinearity F of degree γ . We first obtain dispersive estimates and Strichartz estimates with no admissibility conditions. We next deduce global well-posedness for small L^2 data with no gauge invariance assumption on the nonlinearity F . On the other hand if F is gauge invariant, L^2 conservation leads to global well-posedness for arbitrary L^2 data. Notice that, in contrast with the Euclidean case, these global well-posedness results hold for all finite $\gamma \geq 1$. We finally prove scattering for arbitrary L^2 data under the gauge invariance assumption.

Keywords: Homogeneous tree, nonlinear Schrödinger equation, dispersive estimate, Strichartz estimate, scattering.

MSC: 35Q55, 43A90; 22E35, 43A85, 81Q05, 81Q35, 35R02