

Almost sharp global well-posedness for the defocusing Hartree equation with radial data in \mathbb{R}^5

Xingjian Mu¹, Xingdong Tang², Guixiang Xu¹, and Jianwei Yang³

¹Beijing Normal University

²Nanjing University of Information Science and Technology

³Beijing Institute of Technology

July 31, 2020

Abstract

We show global well-posedness and scattering for the defocusing, energy-subcritical Hartree equation
$$i u_t + \Delta u = F(u), \quad (t, x) \in \mathbb{R} \times \mathbb{R}^5$$
 where $F(u) = \big(V * |u|^2 \big) u$, $V(x) = |x|^{-\gamma}$, $3 < \gamma < 4$, and initial data $u_0(x)$ is radial in almost sharp Sobolev space $H^s \left(\mathbb{R}^5 \right)$ for $s > s_c = \gamma/2 - 1$. Main difficulty is the lack of the conservation law. The main strategy is to use I-method together with the radial Sobolev inequality, the interaction Morawetz estimate, long-time Strichartz estimate and local smoothing effect to control the energy transfer of the solution and obtain the increment estimate of the modified energy $E(Iu)(t)$.

Hosted file

5dHartree.pdf available at <https://authorea.com/users/347730/articles/473302-almost-sharp-global-well-posedness-for-the-defocusing-hartree-equation-with-radial-data-in-mathbb-r-5>