

**NORMALIZED SOLUTIONS
FOR THE SCHRÖDINGER–POISSON SYSTEM
WITH DOUBLY CRITICAL GROWTH**

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ABSTRACT. In this paper we are concerned with normalized solutions to the Schrödinger–Poisson system with doubly critical growth

$$\begin{cases} -\Delta u - \phi|u|^3u = \lambda u + \mu|u|^{q-2}u + |u|^4u, & x \in \mathbb{R}^3, \\ -\Delta\phi = |u|^5, & x \in \mathbb{R}^3, \end{cases}$$

and prescribed mass

$$\int_{\mathbb{R}^3} |u|^2 dx = a^2,$$

where $a > 0$ is a constant, $\mu > 0$ is a parameter and $2 < q < 6$. In the L^2 -subcritical case, we study the multiplicity of normalized solutions by applying the truncation technique, and the genus theory; and in the L^2 -supercritical case, we obtain a couple of normalized solutions by developing a fiber map. Under both cases, to recover the loss of compactness of the energy functional caused by the critical growth, we need to adopt the concentration-compactness principle. Our results complement and improve some related studies for the Schrödinger–Poisson system with nonlocal critical term in the literature.

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Key words and phrases. Schrödinger–Poisson system; normalized solutions; variational methods; L^2 -subcritical; L^2 -supercritical.

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