Long-long or long-short range interactions of nonlinear Schrödinger systems in one space dimension

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We consider the Cauchy problem for the following nonlinear Schrödinger system

$$\begin{cases} i\partial_t v_1 + \frac{1}{2m_1}\partial_x^2 v_1 = \lambda_1 |v_1|^{p_1} v_1 + \mu_1 \overline{v_2} v_3^2, \\ i\partial_t v_2 + \frac{1}{2m_2}\partial_x^2 v_2 = \lambda_2 |v_2|^{p_2} v_2 + \mu_2 \overline{v_1} v_3^2, \\ i\partial_t v_3 + \frac{1}{2m_3}\partial_x^2 v_3 = \lambda_3 |v_3|^{p_3} v_3 + \mu_3 v_1 v_2 \overline{v_3}, \\ v_j(0,x) = \phi_j(x), \end{cases}$$

in one space dimension, where $x \in \mathbb{R}, t > 0, m_j$ is a mass of a particle, v_j is an unknown function, $p_j > 0, \lambda_j, \mu_j \in \mathbb{C}\backslash\{0\}$ for $j = 1, 2, 3$. Global existence and time decay of small solutions are presented under mass resonance conditions. This is a joint work with Nakao Hayashi (Osaka University, Japan) and Shuang Lin (Yanbian University, China).