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Scattering theory for the Gross–Pitaevskii equation in three dimensions

For the Gross–Pitaevskii (nonlinear Schroedinger) equation, which models superfluids (among other things), it is natural to consider non-zero boundary conditions at infinity. This results in richer dynamics than for the standard repulsive NLS with zero BCs at infinity—for example, traveling waves may form. On the other hand, we show that solutions with small, localized energy, disperse for large time, according to the linearized equation. Methods include certain quadratic transforms and bilinear estimates.

This is joint work with K. Nakanishi and T.-P. Tsai.