

Phase retrieval and phaseless inverse scattering with background information

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We consider the problem of finding a compactly supported potential in the multi-dimensional Schrödinger equation from its differential scattering cross section (squared modulus of the scattering amplitude) at fixed energy. In the Born approximation this problem simplifies to the phase retrieval problem of reconstructing the potential from the absolute value of its Fourier transform on a ball. To compensate for the missing phase information we use the method of a priori known background scatterers. In particular, we propose an iterative scheme for finding the potential from measurements of a single differential scattering cross section corresponding to the sum of the unknown potential and a known background potential, which is sufficiently disjoint. If this condition is relaxed, then we give similar results for finding the potential from additional monochromatic measurements of the differential scattering cross section of the unknown potential without the background potential. The performance of the proposed algorithms is demonstrated in numerical examples. This talk is based, in particular, on the preprint [1].

REFERENCES

1. *Hohage T., Novikov R.G., Sivkin V.N.* Phase retrieval and phaseless inverse scattering with background information // preprint hal-03806616 (2022)