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Compressive Shift Retrieval

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The classical shift retrieval problem considers two signals in vector form that are related by a cyclic shift. In this paper, we develop a compressive variant where the measurement of the signals is undersampled. While the standard procedure to shift retrieval is to maximize the real part of their dot product, we show that the shift can be exactly recovered from the corresponding compressed measurements if the sensing matrix satisfies certain conditions. A special case is the partial Fourier matrix. In this setting we show that the true shift can be found by as low as two measurements. We further show that the shift can often be recovered when the measurements are perturbed by noise.

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