

XL Convegno Nazionale di Analisi Armonica

Wavelet phase retrieval for bandlimited functions

Speaker: Francesca Bartolucci

joint work with Rima Alaifari and Matthias Wellershoff

The term phase retrieval indicates a large class of problems in which one seeks to recover a signal from phaseless measurements. In particular, wavelet phase retrieval consists of recovering a signal from the magnitudes of its wavelet coefficients. This problem has already been investigated in [2] for the Cauchy wavelet transform, and later in [1] in a sign retrieval setting, i.e. both the signal and the wavelet are assumed to be real-valued. We consider real-valued bandlimited functions and we derive the first uniqueness results for the recovery of real-valued signals from wavelet magnitude measurements in the case that the wavelet can be complex-valued, i.e. phase and not merely sign information is lost in the acquisition process. In particular, we prove a first uniqueness result for wavelet phase retrieval from samples when the wavelet coefficients are complex-valued.

[1] R. Alaifari, I. Daubechies, P. Grohs, and G. Thakur. Reconstructing real-valued functions from unsigned coefficients with respect to wavelet and other frames. *Journal of Fourier Analysis and Applications*, 23(6):1480–1494, 2017.

[2] S. Mallat and I. Waldspurger. Phase retrieval for the Cauchy wavelet transform. *Journal of Fourier Analysis and Applications*, 21(6):1251–1309, 2015.