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Exploring robust phase retrieval from noisy intensity interferometer measurements using a modern non-linear de-noising technique ELLIOT MYERS, United States Air Force Academy, PETER CRABTREE, AFRL — Various imaging techniques provide measurements proportional to Fourier magnitudes of an object, from which one attempts to form an image. One such technique is intensity interferometry, which measures the squared Fourier modulus. Intensity interferometry is a synthetic aperture approach known to obtain high spatial resolution information, and is effectively insensitive to degradations from atmospheric turbulence. These benefits are offset by an intrinsically low signal-to-noise (SNR) ratio. The fields of image processing and computer vision have produced advanced de-noising methods in recent years, such as BM3D and the bilateral filter. Here we explore the de-noising algorithm of Kovesi, as it was intentionally designed to be phase-preserving – the quantity we aim to recover. Phase retrieval (PR) is designed to reconstruct an image from Fourier-plane magnitudes and object-plane constraints. In particular, we augment the relaxed averaged alternating reflections (RAAR) PR algorithm with the Kovesi de-noising method. We present simulated image reconstructions from the squared Fourier magnitude in the presence of significant noise –with and without the use of Kovesi de-noising as either a single pre-processing step, or an additional step within the RAAR iteration. Author info: C1C Elliot Myers (presenter), First Class Cadet at USAFA; Dr. Peter Crabtree – research advisor at AFRL/RVBYC

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