Photonic noise [1] and partial coherence [2] are the main sources of image degradation for lensless coherent propagation based imaging methods. The achievable resolution is thus a function of these two parameters. In this contribution we report our findings on the influence of noise and partial coherence on coherent imaging techniques. Our results help to design experiments in terms of dose (radiation damage) and propagation parameters to optimize the degree of coherence. To this end we compare coherent diffractive imaging (CDI) in the far-field setting with near-field holography (NFH) in the optical near-field. The number of photons per pixel $\mu$ and finite coherence length $\xi$ have been used as control parameters for the simulations. From that non-ideal measurements can be straightforwardly simulated. These measurements are then used as input for a standard iterative phase reconstruction algorithm (RAAR [3]) which is easily adapted to both imaging cases by exchanging the propagation operator. The obtained reconstructions are used to measure the resulting resolution. Figure 1 summarizes the data generation and results for the resolution. The results show that NFH is quite tolerant against these influences over a wide range of parameters. CDI has shown in our simulations an erratic behavior before reaching full resolution.

References