TOWARDS FDML-ENABLED FLOW-TROUGH QUANTITATIVE PHASE IMAGING

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Recent advances in ultrafast two-photon imaging enable kHz-rate imaging of particles and cells in flow mode [1]. However, such high-throughput operation introduces a practical limitation: a large fraction of imaged objects may be irrelevant or unwanted, leading to inefficient use of imaging bandwidth and data processing resources. A lower-bandwidth imaging modality that would allow for label-free, phase-based discrimination of objects could provide an attractive solution for tandem operation, where only the objects meeting predefined selection criteria are directed to a high-speed two-photon imaging region and trigger data acquisition.

Multiplexed asymmetric-detection time-stretch optical microscopy (multi-ATOM) has been shown to provide such capability using a spectrally encoded line scan [2], a similarity shared with Spectrotemporal laser imaging by diffracted excitation (SLIDE) [3]. Instead of using time-stretch, we employ a Fourier-domain mode-locked (FDML) laser [4], as used in SLIDE, to realize spectro-temporal scanning. We report on an investigation into the applicability of FDML-laser-based spectro-temporal scanning for a multi-ATOM based flow-through quantitative phase imaging system.

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