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Optical detection of sub-micron and nanoscale particles in liquids
SUBECHHYA PRADHAN, MATTHEW MCGRATH, TOBIAS HERTEL, Vanderbilt University — We discuss a scheme for detection of submicron and nanoscale particles using light scattering in combination with lock-in filtering for increased sensitivity and signal-to-noise ratio. In this experiment, suspended submicron and nanoscale particles flow downstream a microfluidic cell until they enter the detection volume where particles are subjected to forced oscillatory motion perpendicular to the flow direction. Scattered light can then be detected in the forward direction by a position sensitive detector or in backscattering geometry using an interferometric confocal setup. The signal to noise ratio is improved over previous experiments making use of low pass filtering by lock-in amplification. We explore the potential of this technique for nanoparticle detection in liquid environment and present preliminary results on the detection of low and high index spherical particles such as polystyrene beads or colloidal gold as well as of high aspect ratio particles such as carbon nanotubes and tobacco mosaic virus.

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