Stain-free Flow cytometry by 3D Phase-contrast tomograms: toward the intracellular specificity

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Flow cytometry is a very important tool for cell screening and analysis in high-thruputs mode. So far flow-cytometers can be divided in two main classes. One is based on fluorescent microscopy that allows direct visualization in 2D of each single cells but requires staining of cells. The second class is based on the light scattering capable to retrieve some information on cellular structures but deprived of direct imaging of cells. Quantitative phase imaging (QPI)based on digital holography permits to open the route for a new class co flow-cytometers in stain-free modality. Recent developments on the tomographic flow-cytometry in phase-contrast mode will be described and discussed. Moreover, it will be shown how analysis of 3D tomographic data seems to be promising in overcome the lack of specificity that in fact is the typical drawback of QPI imaging for subcellular structures.