



# 3D Phase Contrast Microscopy for Flow Cytometry

We offer a technology to perform label-free, real-time identification of microorganisms, and other colloids. The technique “Holographic Phase-Contrast Micro Cytometry” is developed by us and can track the motion of individual microparticles in 3D.

## BACKGROUND

Individual cells can be visualized by, e.g., phase contrast microscopy. It is a much-used label-free technique, but its depth of focus and throughput are limited. Populations of cells are analyzed statistically using flow cytometry, which either uses a limited number of fluorescent labels or scattering information that cannot be interpreted in terms of tangible cell properties. There are currently no techniques that combine all advantages, namely providing information-rich, label-free 3D-imaging in a high-throughput format. Such methods would enable also analyzing subpopulations of bacteria and other bio-colloids.

## TECHNOLOGY

With the ‘Holographic Phase-Contrast Micro Cytometry’ we have developed a new technique that combines the best of 3D phase-contrast imaging and cytometry. We record the interference between light scattered by, e.g., bacteria in a flow cell and the illuminating light. Using the principles from holography, we then calculate the full light field, which allows us to quantify throughout the sample how much light was scattered. The 3D light field enables locating individual organisms and quantifying the amount of scattering related to their dry mass as well as their shape and orientation.

Since we obtain all this information from a single snapshot, we can locate and further track the individuals to characterize dynamic properties such as diffusion, sedimentation, and propulsion. By considering the positions during accelerations, we can measure interactions with different substrates or between individuals. In addition, by analyzing recorded movies, we can obtain population-wide statistics on these properties that could lead to novel insights on behavior and physical capabilities. These properties could be used to classify currently unknown subpopulations.

## OUR OFFER

We are currently building a prototype including suitable software based on our unique IP and know-how. We seek partners to develop applications in medicine, cosmetics, food industry and biotechnology in general, that currently use cytometry and would like to know more about subpopulations by 3D Phase Contrast Flow Cytometry. That also includes the option to sort on given characteristics or the characterization of sub-500 nm objects.

We also invite partners interested in commercialization of the instrument, which offers more information, label-free analysis, higher sample flexibility, and at a lower cost than current leading cytometry instruments.

## EXPERTS

Univ.-Prof. Dr. Erik Reimhult

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## AVAILABLE FOR

- Joint Research Project

## KEYWORDS

- 3D Microscopy
- Flow cytometry
- Microfluidics
- Population based analysis
- High-throughput
- User friendly interface



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