

AUTOMATIC IMAGE PROCESSING FOR SINGLE ION IRRADIATION OF CELLS

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Ion microprobes have demonstrated their benefits in many fields of science. Nowadays, one can open new scientific horizons using it for a single ion bombardment of living biological cells. This task is, however, accompanied by many technical difficulties. Among the others, in order to obtain reliable results of the irradiation, cells must be examined in a well controlled environment. For certain experiments cells should not only survive irradiation, but also any external factors should be minimized, e.g. it would be beneficial to avoid staining or illuminating them by UV light. However, cells are transparent, phase objects and avoiding staining impedes the precise, automatic recognition of cells that is crucial for obtaining statistically significant data (in a typical single ion bombardment experiment thousand(s) objects should be identified and irradiated).

In our study we discuss all crucial steps of cells image processing, from taking the image using a contrast enhancing technique Quantitative Phase microscopy (QPm) [1] up to complex sequences of image transformations (filters, logical operations etc.) leading to reliable recognition of cells. The accompanying software takes the input from image recognition program and, by controlling a motorized precise table and an ion beam, assures automatic irradiation of a sample. Performance of the whole system is illustrated in the poster.

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[1] E. D. Barone-Nugent, A. Barty, K. A. Nugent, J. Microscopy **206** (2002) 194.