

# Topological Proteomics

A new perspective in protein research, aiming  
at revealing the “secret life of a living cell”

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## Abstract

One of the most important aspects of cellular protein networks is the spatial distribution of the proteins across cell compartments (membranes, nucleus, mitochondria, etc.). That means that for some cellular function (like cell migration) to be exerted, a cell has not only

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to synthesize the necessary amounts of specific proteins, but also to distribute them within the cell in the specific way that is required for the cell function in question. Conventional proteomics profiling tools that are based on *homogenizing* cell samples do, almost by definition, not provide any information on this important aspect of molecular processes taking place in a cell — an aspect, however, that appears to be closely related to normal and abnormal functioning of the cell.

To provide such information, a new multi-parameter fluorescence-microscopy technique called MELK<sup>1</sup> was developed at Magdeburg University by WS and his coworkers; it is discussed in [1] (see also [2, 3, 4, 11, 12]). Details regarding this technology and the tasks associated with the data obtained by using it are discussed in [5, 6]; for biological applications of MELK Technology, see [7, 8, 9, 10, 13]. This technique produces a whole stack of intensity images of one and the same biological object (for example, a slice of nervous tissue), each image in that stack corresponding to one particular protein (or any other biologically relevant molecule of interest). Two typical gray-level images are shown in Fig.1.

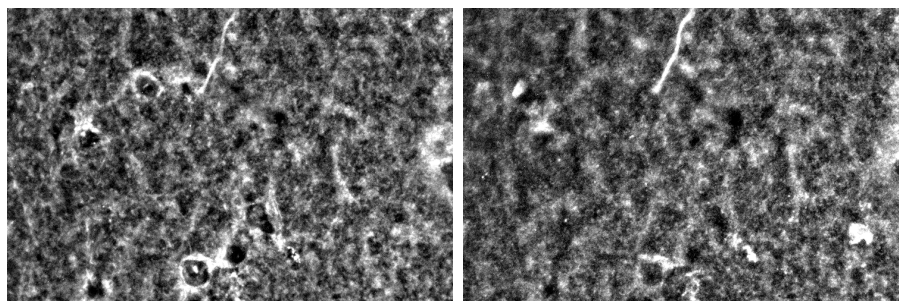


Figure 1: Two fluorescence images displaying the spatial distribution of two different proteins across a slice of nervous tissue.

In the lecture, I will present some important details regarding this technology as well as various applications as outlined in [1].

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