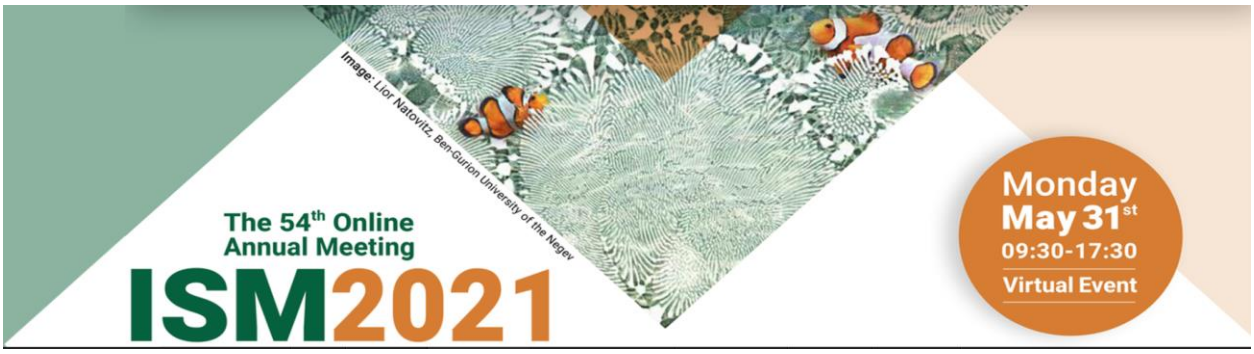

NEW CONCEPTS TO STUDY SINGLE MOLECULES ON MEMBRANES

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The constitutive role of membranes for cellular life cannot be overestimated. Besides forming the dynamic boundaries of cells and organelles, they are home to about a third of all cellular proteins, many of which are however only peripheral. Their spontaneous interactions with or transient binding to membranes are, in spite of their tremendous importance for the life sciences, still a “blind spot” in biomolecular analytics.

In the past years, my lab has developed highly potent methods to study the binding and dissociation of single molecules to and from membranes in equilibrium. One branch of methods is based on localization-based fluorescence fluctuation spectroscopy, analyzing the mean on-off cycle of molecules entering and leaving the evanescent field of a TIR-illuminated membrane surface. Another recently developed method expands label-free mass photometry to membranes. It does not only enable us to track single molecules on membranes label-free, but also to determine the mass growth and shrinkage of molecular assemblies, key for understanding the cooperative self-assembly and molecular feedback mechanisms at the basis of self-organizing biological systems, such as protein pattern formation.