Miniproject DTC Complexity

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## Large deviations on macro and microscopic scales: observation, prediction and control

In many cases the studied object can have several levels of description, e.g. macro and microdescriptions by using different levels of detailed elaboration. For example, Hodgkin-Huxley neuronal model describing a myelinated nerve fiber. The fiber can be presented either as a large number of kinetic equations or a set of low-dimensional stochastic differential equations. Another example is the magnetization reversal in a spin valve pillar which can be considered on the both macrospin level using corresponding Landau-Lifshitz-Gilbert equation or microspin level using 2- or 3- dimensional network of coupled oscillators.

In this project a correspondence between macro-fluctuations and micro dynamics will analysed and, the existence of most probable fluctuations on micro and macro-levels will be checked. The existence of such fluctuations leads to an effective control on both macro and micro levels.