**Postdoctoral Mentoring Plan**

The educational aspect of the proposed research program is a high priority in both of the collaborating labs. Both of the collaborating PIs have an extensive and impressive record of teaching both students and postdoctoral fellows, and the alumni of their labs are spread over the world in prestigious academic positions as well as in leading roles of industry. The labs are both set to educate and train the postdoctoral fellows, and the process of integration and cooperation of all the researchers within the lab is of utmost importance. The proposed program is, in many ways, an ideal framework for the educational development of both postdoctoral fellows and Ph.D. students. This is because of the enormous interdisciplinary scope of the project, where the postdoctoral fellows and Ph.D. students will be able to learn a broad range of novel topics. They will be intensely exposed to a huge variety of concepts and approaches stemming from statistical and experimental physics and from neurobiology, extending from heavy experimental technique to the pure analytical and computational theoretical concepts.

Since the US lab specializes in the theoretical aspects while the Israeli side is an experimental lab, the postdoctoral and Ph.D. students will benefit from a diverse cross-pollination of ideas and of approaches. The postdoctoral fellows will travel extensively during the academic year, spending at least a month per year in the other collaborating lab. Focus will also be made on sending the postdoctoral fellows to conferences where they can learn about the state of the art in the field and will also be able to interact with members of the collaborating lab.

A prime example for the advantages that the collaboration can yield is found in Dr. Yaron Penn, the postdoctoral fellow that will be funded in part by the program. Yaron has been trained as a neuroscientist, with excellent proficiency in patch clamp and a deep understanding in biological issues such as animal stress, but little exposure to theoretical concepts or quantitative approaches. Coming to our lab, he has gone from using canned programs to a home-made approach based on a combination of C++ and Matlab, and is now controlling his experiment using Multi-Electrode Array in all its stages. This has allowed him to learn the intricacies of analysis of the data, based on the concepts of graph theory and statistical physics. We expect the proposed collaboration to allow Yaron to learn the concepts of computational theory, and to introduce quantitative measures of information into the experiment. This will be achieved by weekly discussions with the US PI and his group, where he will learn from them the tools and the conceptualization leading from an experiment into quantitative measurements and then from experimental numbers to a comparison with the numerical results of an equation.

In terms of technique, our lab already employs an impressive range of technologies, with a broad combination of confocal and fluorescence microscopy, along with multi electrode arrays and electrophysiology. Magnetic, electrical and chemical stimulation of living neuronal networks are standard that we have developed. In addition, we expect that the novel techniques of microfluidics and optogenetics will enhance the experimental arsenal of the postdoctoral fellows, since these are by now the most advanced tools at the disposal of experiments on computation in neuronal systems.