**BUDGET JUSTIFICATION**

**Prof. Anat Levin**

**Part A. Senior/Key Personnel**

Key Personnel

Anat Levin, Ph.D., Principal Investigator (1.2 calendar months, 10% effort). Prof. Levin has 25 years of experience in computer vision, machine learning and optics. Her lab has expertise in advanced computational imaging systems and algorithms, in particular in wavefront shaping. Prof. Levin’s lab will be in charge of the optical setup for wavefront shaping, as well as of the development of advanced algorithms for improving its performance. Prof. Levin will oversee the day to- day operation of personnel, provide timely updates on progress and be responsible for all research communication that is expected from the proposed studies.

**Part B. Other Personnel**

*Graduate Student*:

PhD student (100% effort). In year 1, Mr. Dror Aizik (to be replaced by another student later). Mr. Aizik has built the first successful wavefront shaping system in Prof. Levin’s lab and is the most knowledgeable person behind it. In the project he will be responsible for converting his wavefront shaping system to the project specifications, demonstrating the first optical prototype using single photon excitation outlined in Aim 2, testing it on ex-vivo slices and supporting the Berkeley team when testing it in-vivo. In later stages of the project, he will work on further accelerating the wavefront shaping estimation process and improving its robustness.

*Lab manager*:

Marina Alterman, PhD., Lab coordinator and manager (50% effort). Dr. Alterman has 15 years of expertise in computational imaging and optics and has been with Prof. Levin since 2017. She will help in the development of the optical setup and its experimental testing. She will also oversee the day-to-day operation of the lab, train the student and oversee supplies and reagents to the lab on regular basis.

**Part C. Equipment**

We request the following major equipment items:

12 kHz Galvo-Resonant Scanner and Controller $15,140

Hnu Nuvu 128 EMCCD camera $40,000.00

Coherent Sapphire 488-500 LPX CDRH Laser Head $15,370

**Part D. Travel**

One trip to an international meeting for Prof. Levin and a PhD student. We also plan to use the travel budget for travel between Technion and Berkeley. To support the collaboration, Technion students will travel to Berkely to help utilizing their system for in-vivo usage. A total of $20,000 is requested annually.

**Part F. Other Direct Costs**

1. *Materials and Supplies*:

Will be used for many optical components needed for building the wavefront shaping setup. This includes fast spatial light modulators, objectives, accurate motion stages as well as a variety of other opto-mechanical equipment. More items will be needed in year 1 for building the initial system. $60,000 is requested in year 1 and $30,000 in years 2 & 3.

1. *Publication Costs*

$5,000 a year is requested for Open Access publications in widely known journals.

1. *Facility/User Fees (Laboratory / Technical Services)*

Refer to the usage of machine shop, microscopy unit facilities and clean room facilities, as well as the cost of utilizing existing equipment and Technion facilities allocated to our own lab. $20,000 annually is requested.

1. *Computing services*

Our project includes a substantial computational part, and we request funding for the usage of strong clusters at an annual cost of $6,000.

**Part H. Indirect costs**

MTDC rate of 8%.