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Toward Monte Carlo simulation of light propagation in mouse cortex in vivo THOMAS SAUER, NICHOLAS STAFFORD, PEIFANG TIAN, John Carroll University — The advent of two-photon laser scanning microscopy (TPLSM) has opened unprecedented opportunities in revealing neuronal firing, hemodynamic changes, and metabolic activity on microscopic level *in vivo*. However, data interpretation of TPLSM on dyes with small signal change faces enormous challenge because the measured signal change is often highly distorted by hemodynamic changes. We seek to understand this problem quantitatively by simulating light propagation in a spatially heterogeneous and temporally varying scattering medium: the cortex of a mouse during stimulation. To do this, we will use a public available Monte Carlo simulation software MCX that uses Graphics Processing Units (GPU) based massively parallel computing techniques [Fang and Boas, Opt. Express 17, 20178 (2009)]. As a first step, we installed and tested all the hard- and soft-wares on 4 computers including GPU cards, Compute Unified Device Architecture (CUDA) software package, and MCX. We ran MCX simulation on simple brain models and obtained the same results as shown in [Fang and Boas, Opt. Express 17, 20178 (2009)]. We will model the light propagation in the cortex with a 3D heterogeneous absorption profile determined by the realistic microvasculature from our own experimental data.

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