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Presentation Abstract

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Presentation Title: Automated image-guided whole-cell patch clamp technology for mapping functional neuronal circuitry

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Presenter at Poster: Tue, Nov. 18, 2014, 1:00 PM - 2:00 PM

Topic: ++G.04.b. Optogenetics

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Abstract: One of the critical questions in neuroscience is how brain neural networks perform computations necessary for higher level cognitive functions. To answer this question one needs to record electrical activity of individual neurons with synaptic resolution. The tool best suited to address this question is the whole-cell patch clamp technique with which multiple aspects of excitatory and inhibitory synaptic currents, cellular excitability, and interneuronal connectivity can be characterized. However, this method is slow and currently requires the high level of expertise of the experimenter to achieve good recordings. We have developed a new image-guided Autopatcher system for brain slices and primary neuronal cultures, extending the “blind” in vivo automated whole-cell patch clamp prototype published previously. The system presented here is an image-guided whole-cell patch clamp electrophysiology suite for analyzing synaptic currents and

electrophysiological properties of single neurons in vitro, and can be combined with Channelrhodopsin-Assisted Circuit Mapping (CRACM) to map functional connectivity in different brain areas.

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