

# **Precise Spatiotemporal Firing Patterns Underlying Persistent Activity in Cultured Neuronal Networks**

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Persistent activity has been widely studied because of its involvement in working memory and motor planning. Previously, we have observed persistent network reverberation in cultured hippocampal neurons. Here, we investigated the spatiotemporal dynamics of such collective activities of neurons, which grown on multi-electrode arrays (MEAs). When analyzing the timing of neuron firing activities, we found that many reverberation events, which involved several neuron spiking activities in a time window of around 50 ms, showed similar firing patterns with precision of a few milliseconds. When the network reverberation was evoked by stimulating an input channel, only one or two unique spatiotemporal patterns were identified. Our results suggest that neural circuits are capable of maintaining precise spatiotemporal patterns of reverberatory activities that could be utilized as an efficient way of information coding.