

# MUTUAL INFORMATION BETWEEN THE MYELINATED NERVE FIBERS WITH MISALIGNING RANVIER NODES BY EPHAPTIC COUPLING

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## ABSTRACT

Closely packed neurons in fiber bundles laterally interact and may synchronize information flow through the potential change of the extracellular medium of the perineurium. This phenomenon is known as ephaptic coupling. The diffusion process occurs at Ranvier nodes, where the axon is partly unwrapped by insulting myelin. The geometric alignment of Ranvier nodes and the neuron's curvature become an essential factor for ephaptic coupling. Here we conduct a computerized 2D neural spike simulation for a myelinated fiber model, enabling ephaptic coupling by considering the change of the extracellular potential. The mutual information, known as the shared information between the output spike trains, is measured using the density estimation method. Mutual information provides a quantitative measure of how neural information is conserved and synchronized from one location of the brain to another through myelinated nerve fibers.