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## ***On the Role of Intrinsic Neuronal Dynamics for Relay Synchronization***

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### **Abstract–**

Synchronization plays a vital role for most functional activities of brain and body, and many different forms of synchrony like phase-locking or complete synchronization have been shown to occur in the interaction of neurons. Recently, a new form of synchronous behaviour has been discovered in a general context where two oscillators synchronize without being directly coupled, and the information transmission is going only via a third, relaying oscillator which is not synchronizing with the other ones. This phenomenon has been named „relay synchronization“ or „dynamical relaying“ [1]. For the first time, a thorough computational study of the effect of different intrinsic dynamical states of model neurons exhibiting relay synchronization under gap-junction coupling is presented in our work. All calculations are carried out using the four-dimensional Huber-Braun neuron model [2]. Depending on the dynamical state of each individual neuron in the chain, the conditions under which relay synchronization can appear and break down are elucidated using bifurcation theory and statistical methods. The mechanism behind the phenomenon is investigated, and implications for physiological processes using relay synchronization on the basis of synaptic plasticity are discussed.

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### **References**

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