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Measurements of synchronization between interacting networks in a model of focal epilepsy[1] S. FELDT, Dept. of Phys., Univ. of Michigan, H. OSTERHAGE, Dept. of Epileptology and Helmholtz-Institute for Radiation and Nuclear Phys., Univ. of Bonn, Germany, F. MORMANN, Div. Biol., Caltech., and Dept. of Epileptology, Univ. of Bonn, Germany, K. LEHNERTZ, Dept. of Epileptology, Helmholtz-Institute for Radiation and Nuclear Phys., and Interdisc. Center for Complex Sys., Univ. of Bonn, Germany, M. ZOCHOWSKI, Dept. of Phys.and Biophys., Univ. of Michigan — We use a simple model of two interacting networks of neurons to explain a seemingly paradoxical result observed in epileptic patients indicating that the level of phase synchrony drops below normal levels during the preictal state. We show that the transition from the interictal to preictal and then to ictal state may be divided into separate dynamical regimes: the formation of slow oscillatory activity observed during the normal (interictal) period, structureless activity during the preictal period when the two networks have different properties, and bursting dynamics driven by the network corresponding to the focus. We thus hypothesize that the beginning of the preictal period marks the beginning of the transition of the focal network from normal activity towards seizing and compare our results to measurements of the preictal length in human patients.

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Sarah Feldt
Department of Physics, University of Michigan, Ann Arbor, MI 48109

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