Live Experiments: Implementing Network Models with the FACETS Hardware

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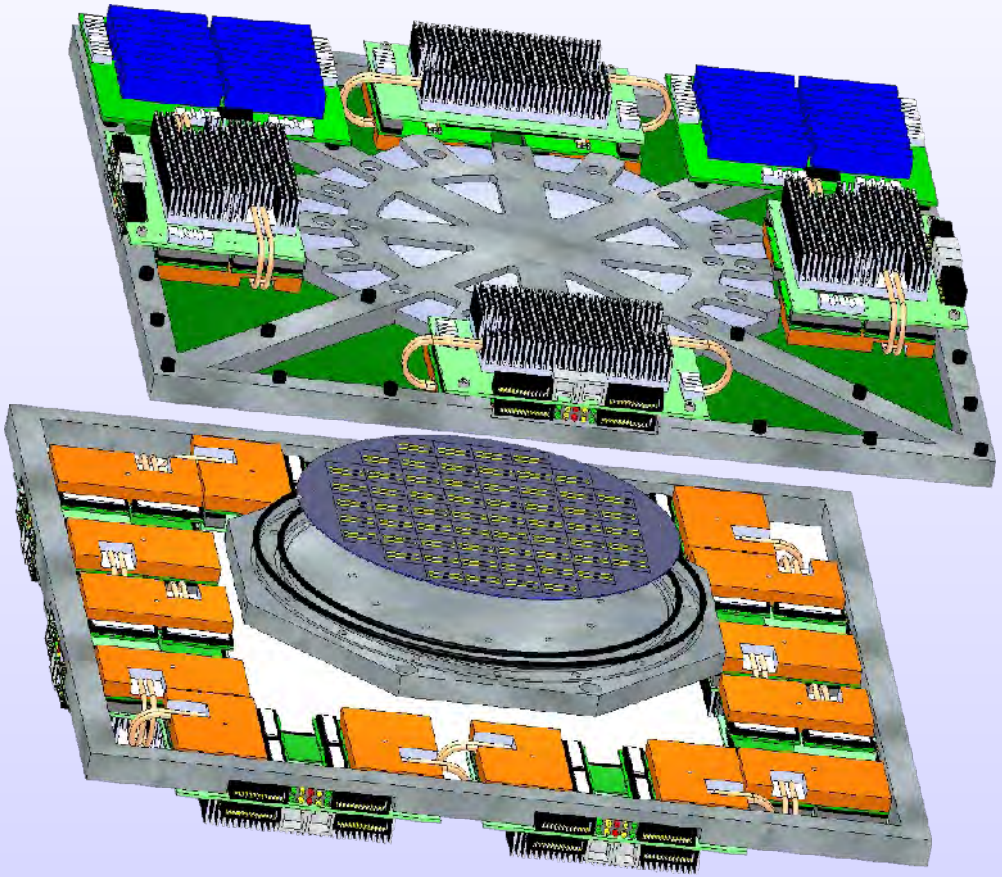
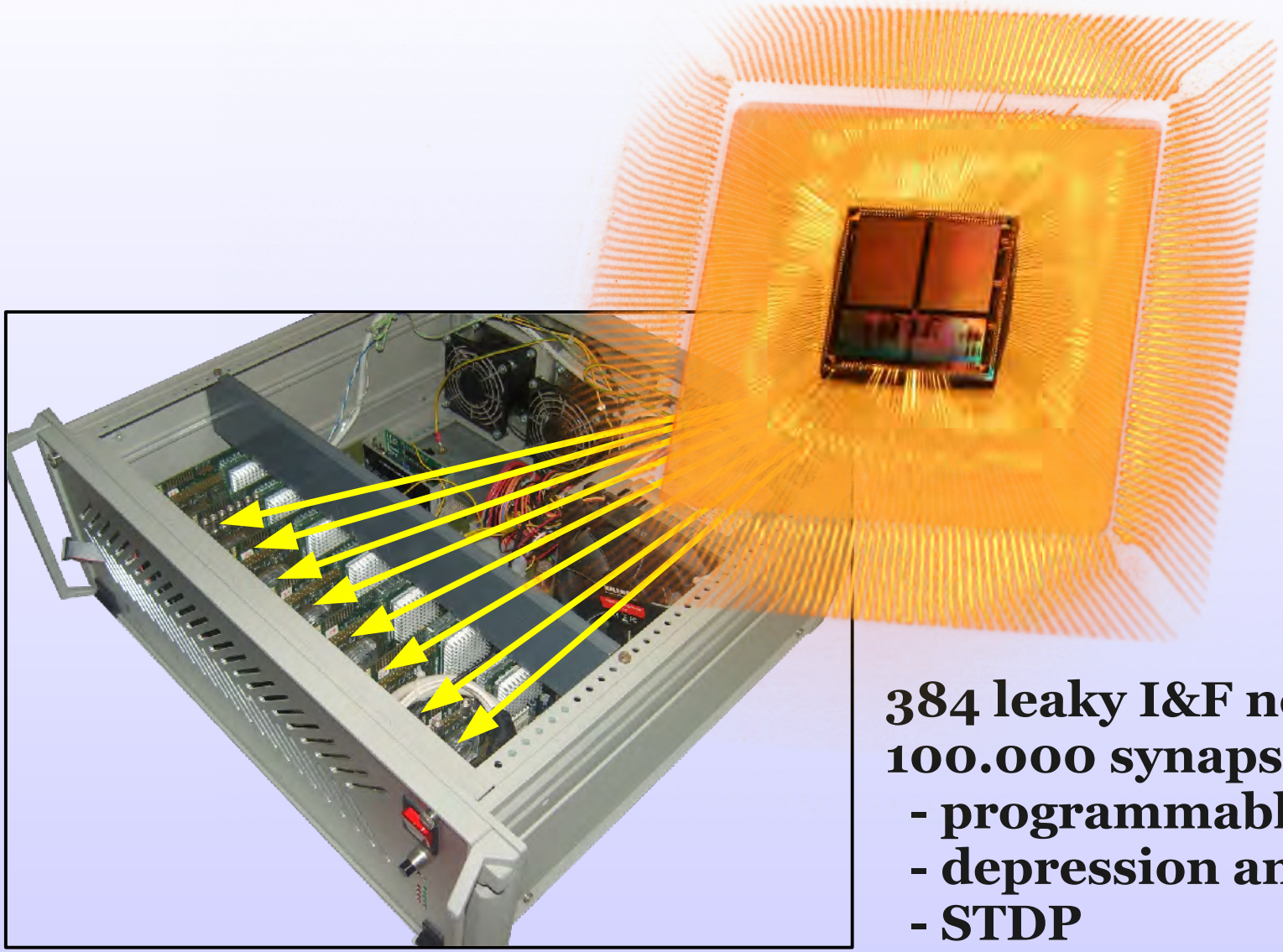
Heidelberg

The FACETS Wafer-Scale Hardware



Up to 200.000 AdEx neurons
50.000.000 plastic synapses
10^4 times faster than biological real time

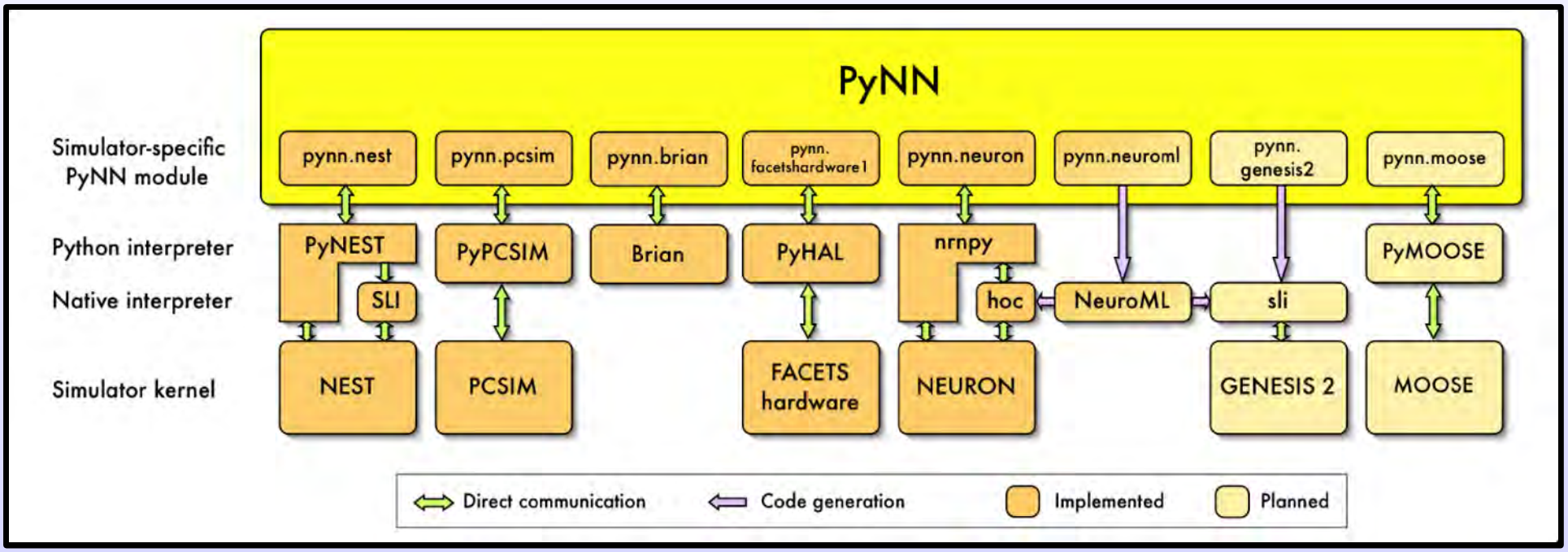
The FACETS Stage I Chip



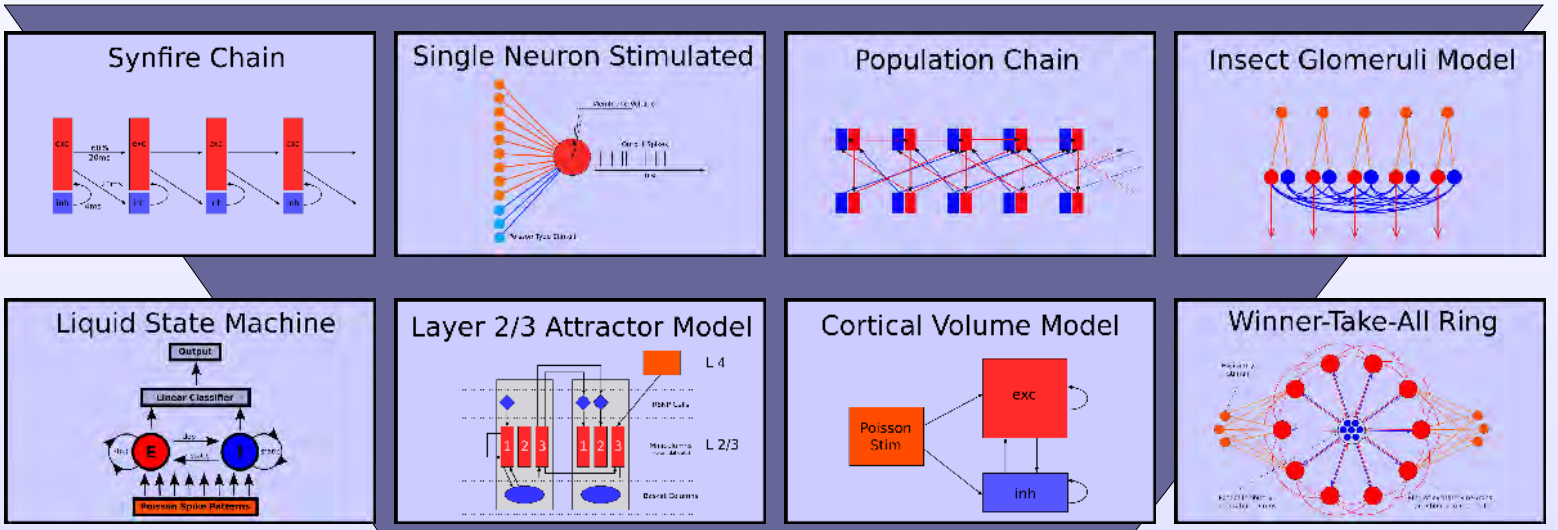
384 leaky I&F neurons
100.000 synapses
- programmable weights
- depression and facilitation
- STDP

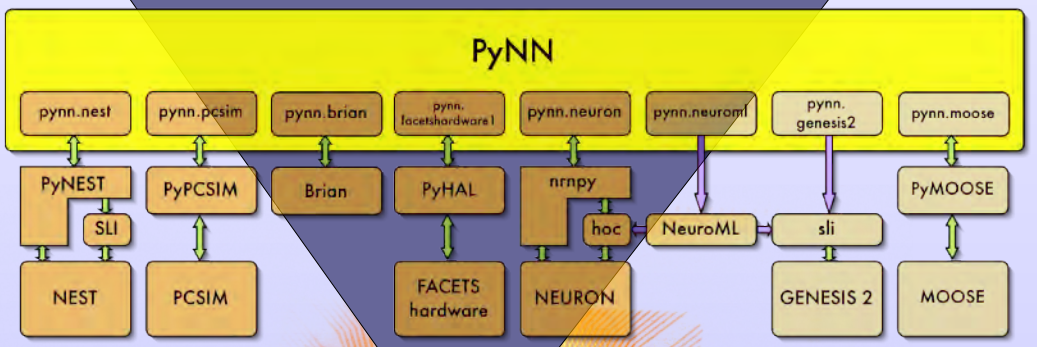
10^4 times faster than biological real time

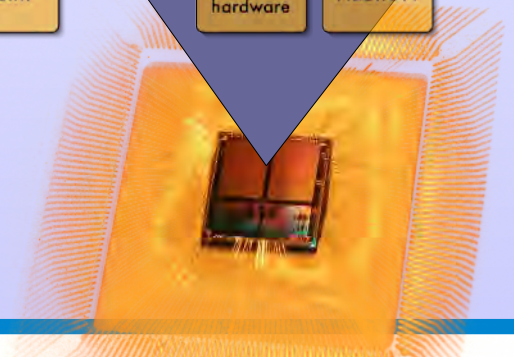
Unified Interface Language for Multiple Software Simulators and the FACETS Hardware



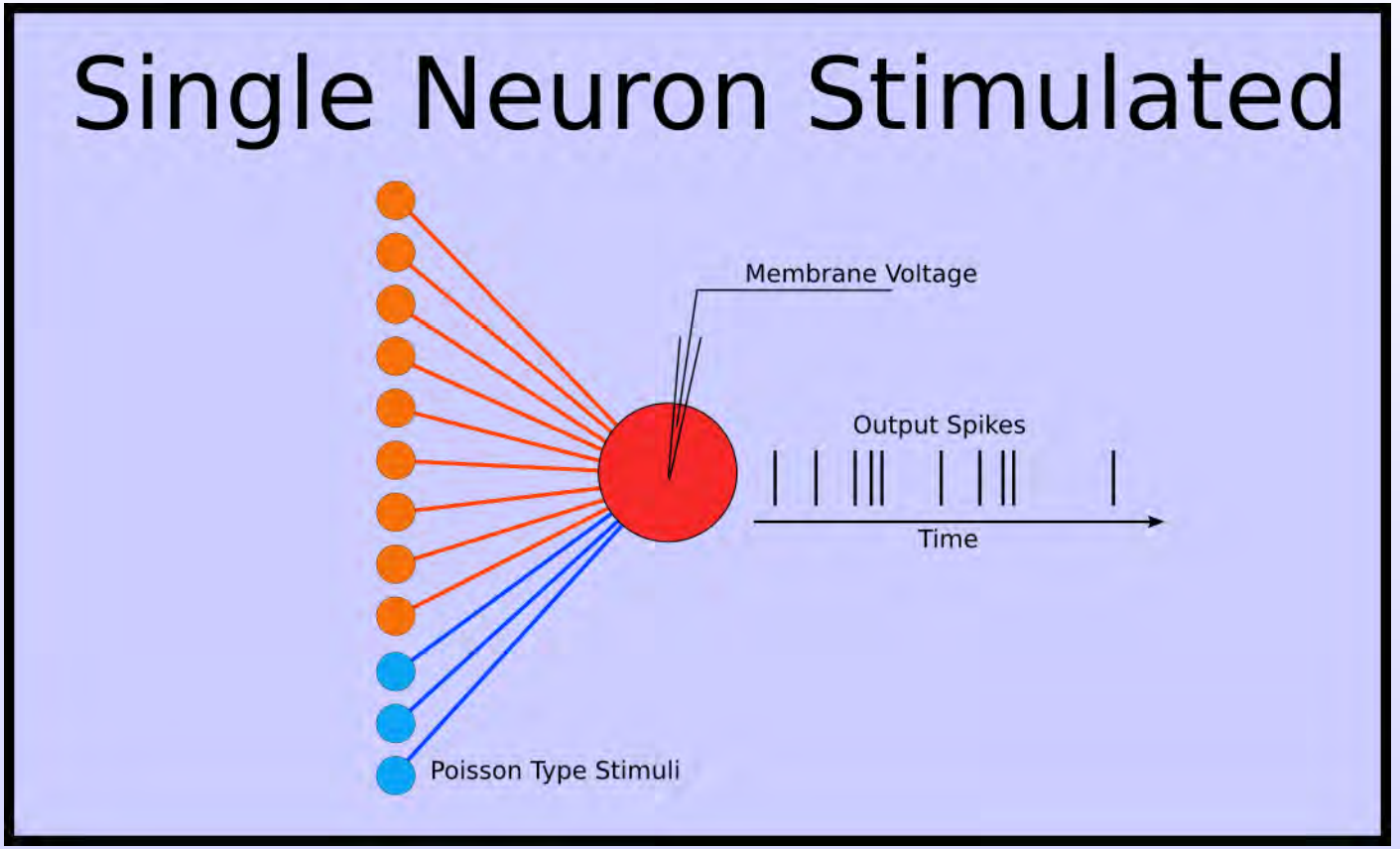
Mapping Arbitrary Network Models to the FACETS Hardware





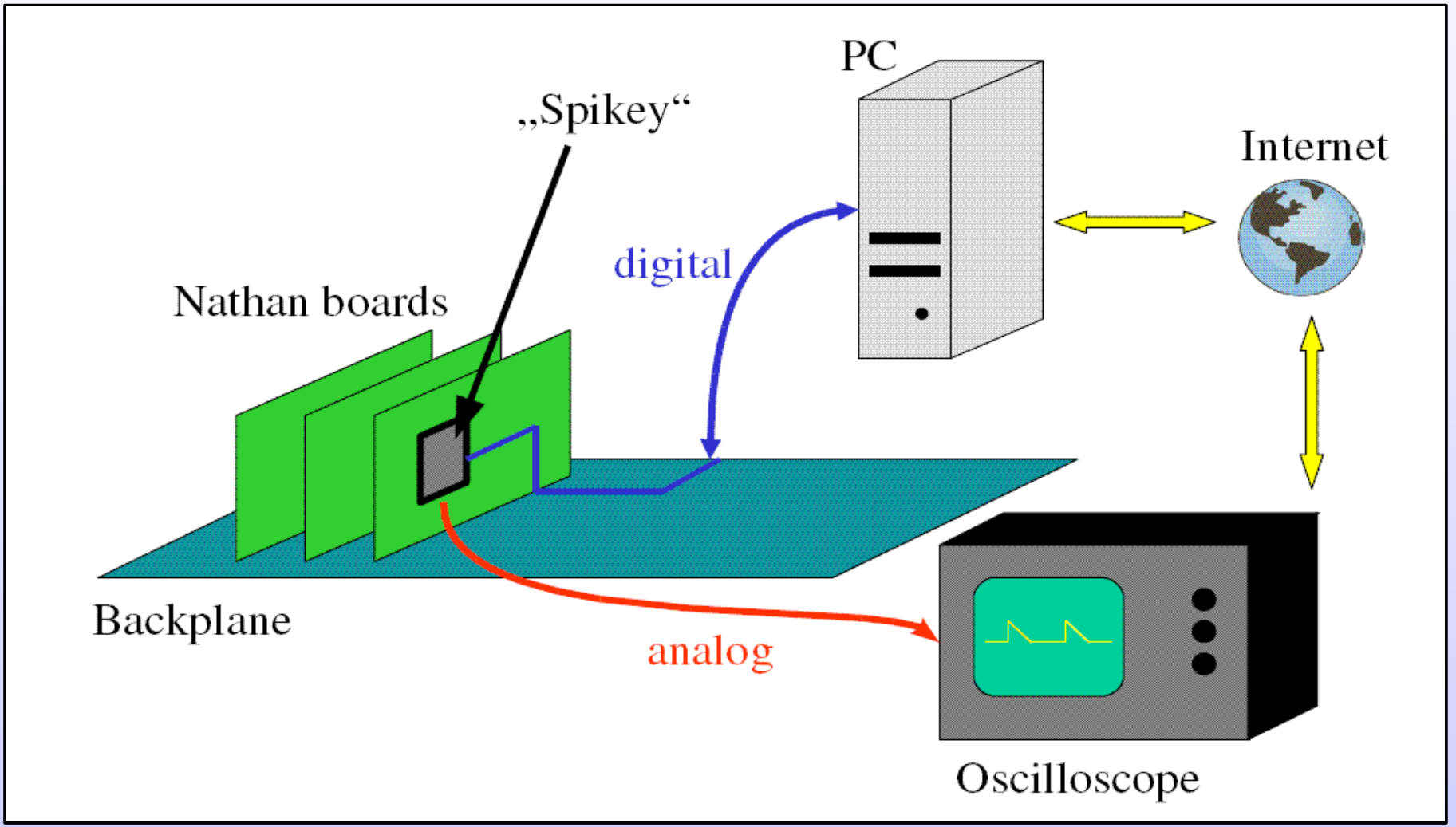


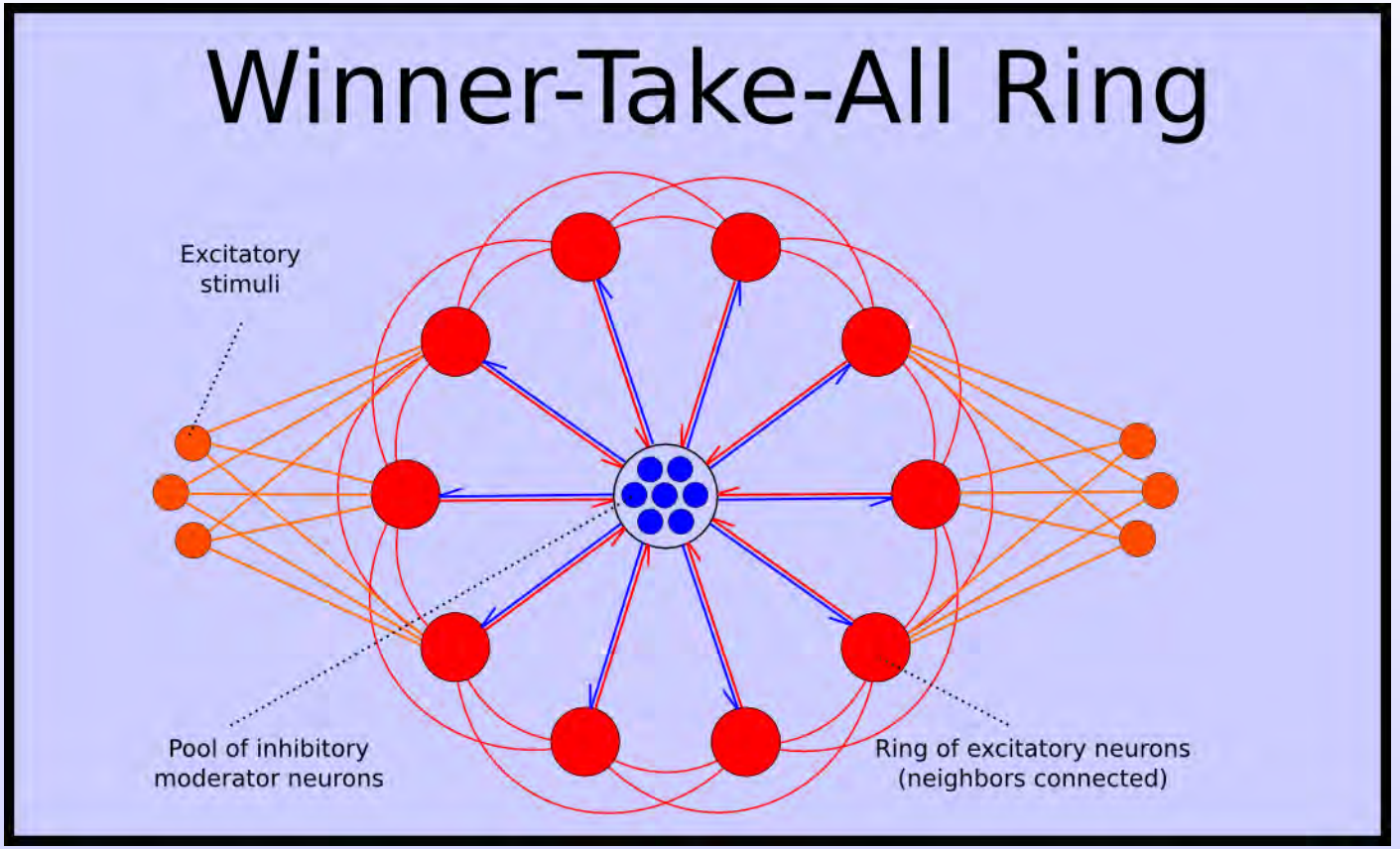
Single Neuron Stimulated



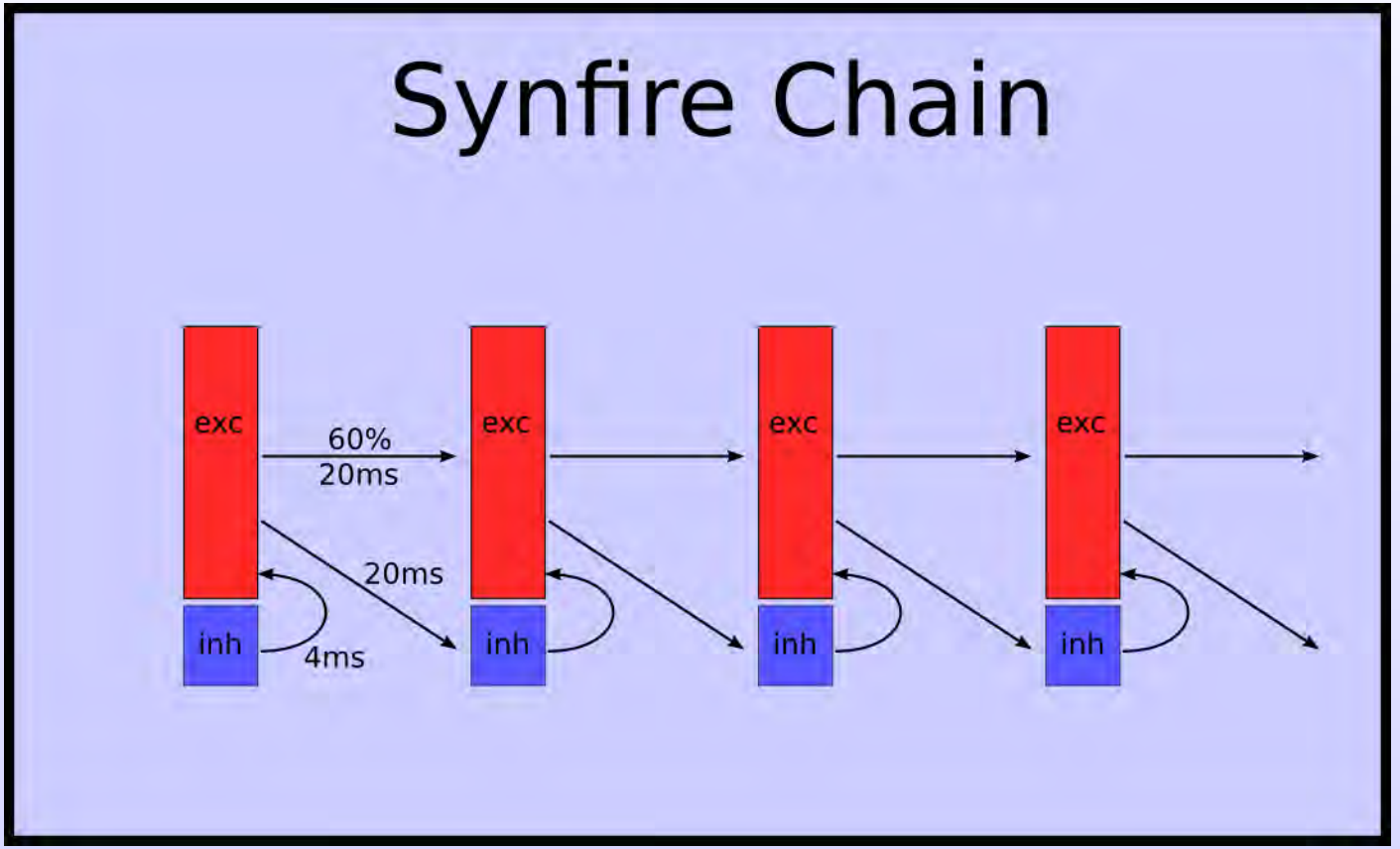
Hardware Implementation: D. Bruederle

The FACETS Stage I System



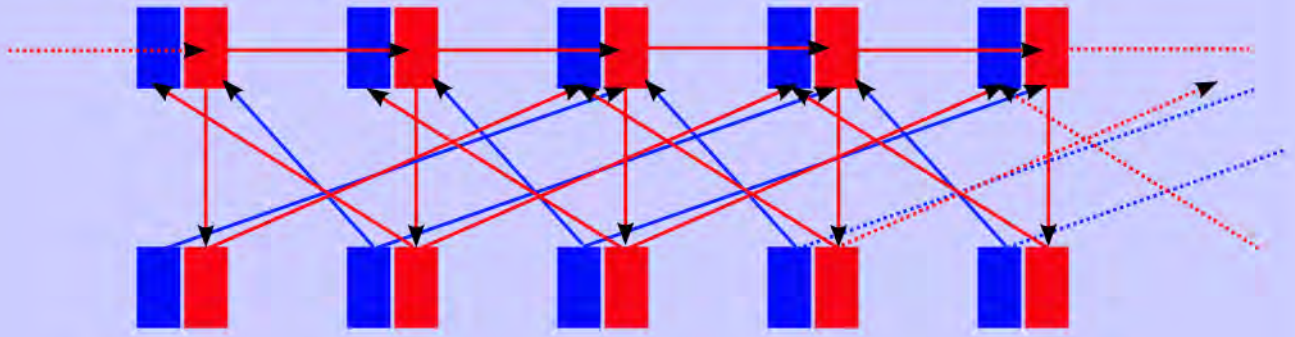


Modeling Orientation Selectivity Using a Neuromorphic Multi-Chip System. Elisabetta Chicca, Patrick Lichtsteiner, Tobias Delbruck, Giacomo Indiveri and Rodney J. Douglas. ISCAS 2006. Hardware Implementation: D. Bruederle, E. Mueller

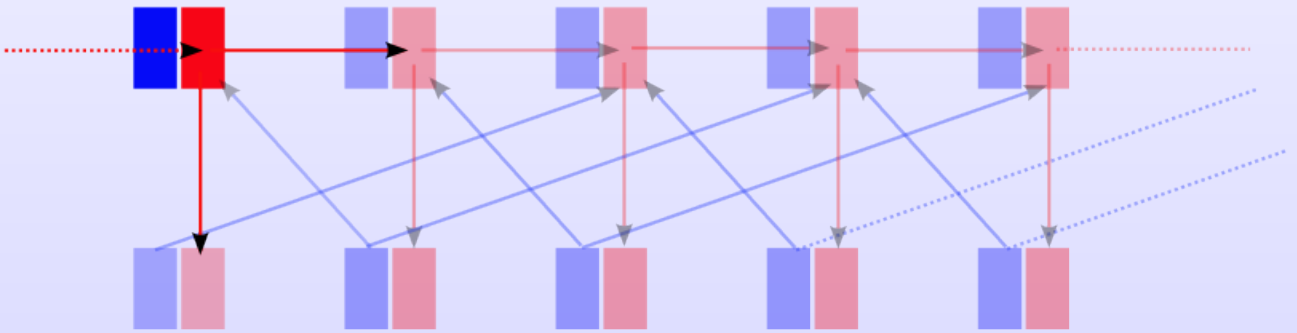


Functional consequences of correlated excitatory and inhibitory conductances. Kremkow, J., Perrinet, L., Aertsen, A. and Masson, G.S., Journal of Computational Neuroscience 2010
Hardware Implementation: J. Kremkow, M. Petrovici

Population Chain



Concept: T. Clayton, D. Bruederle
Hardware Implementation: T. Clayton, D. Bruederle



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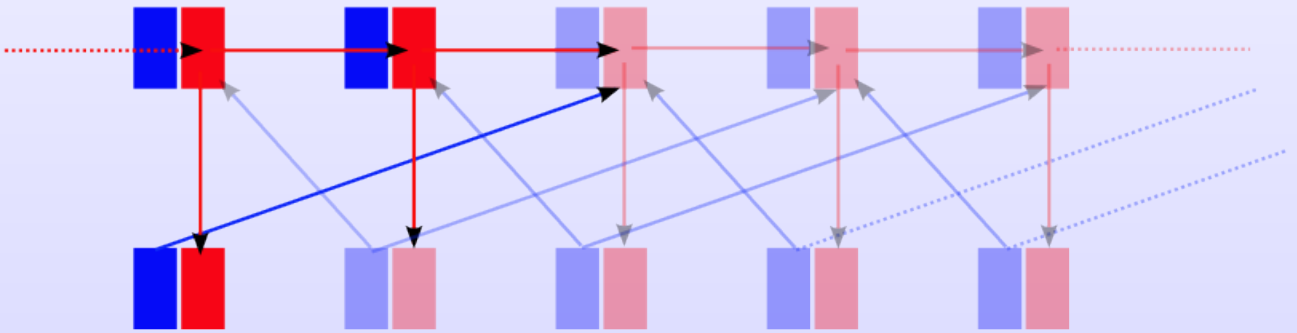

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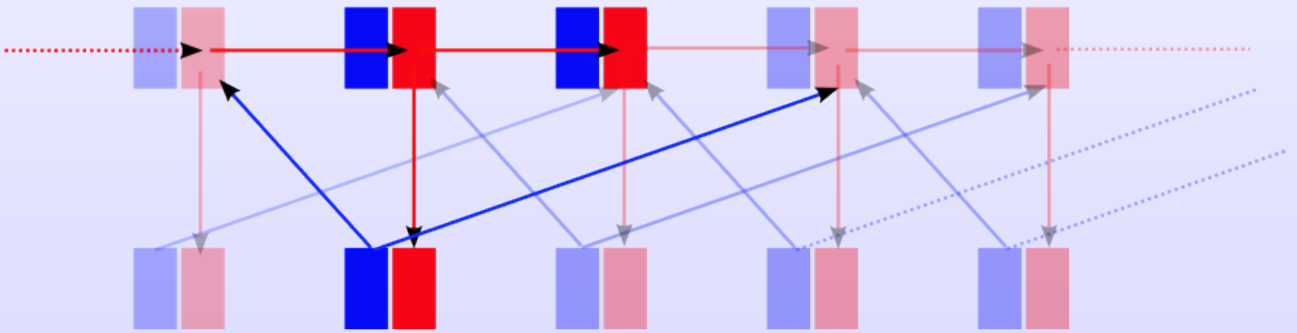

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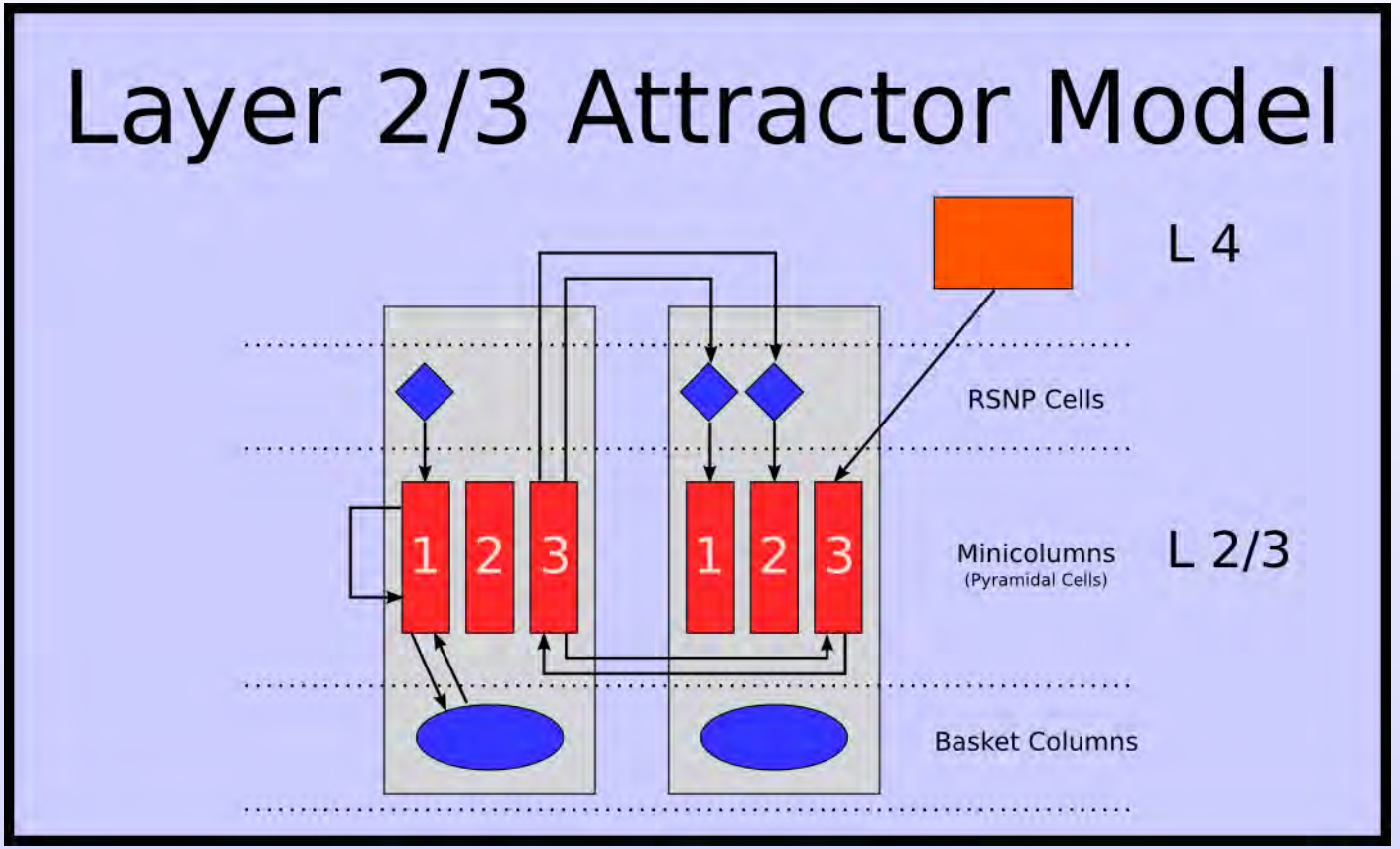
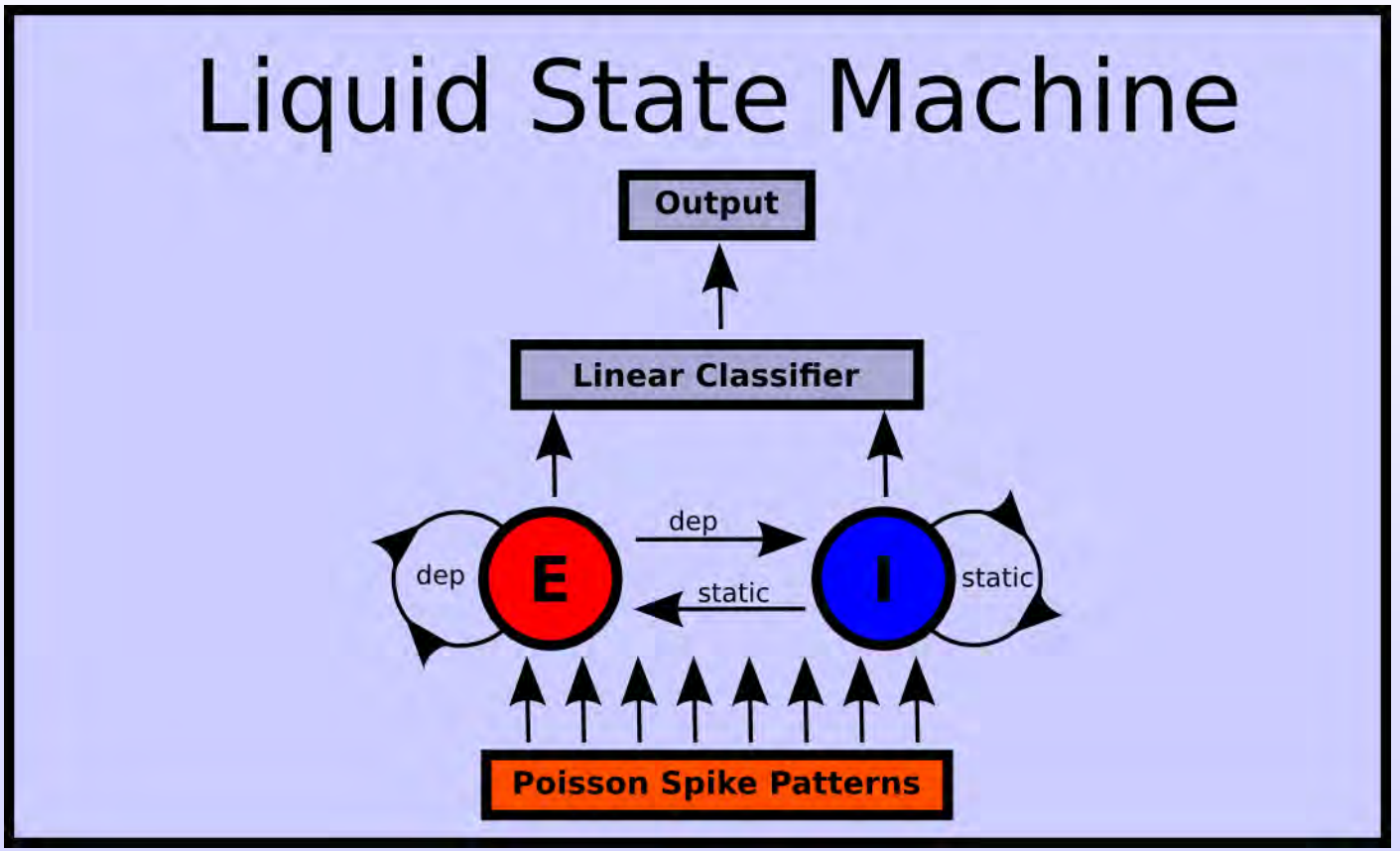
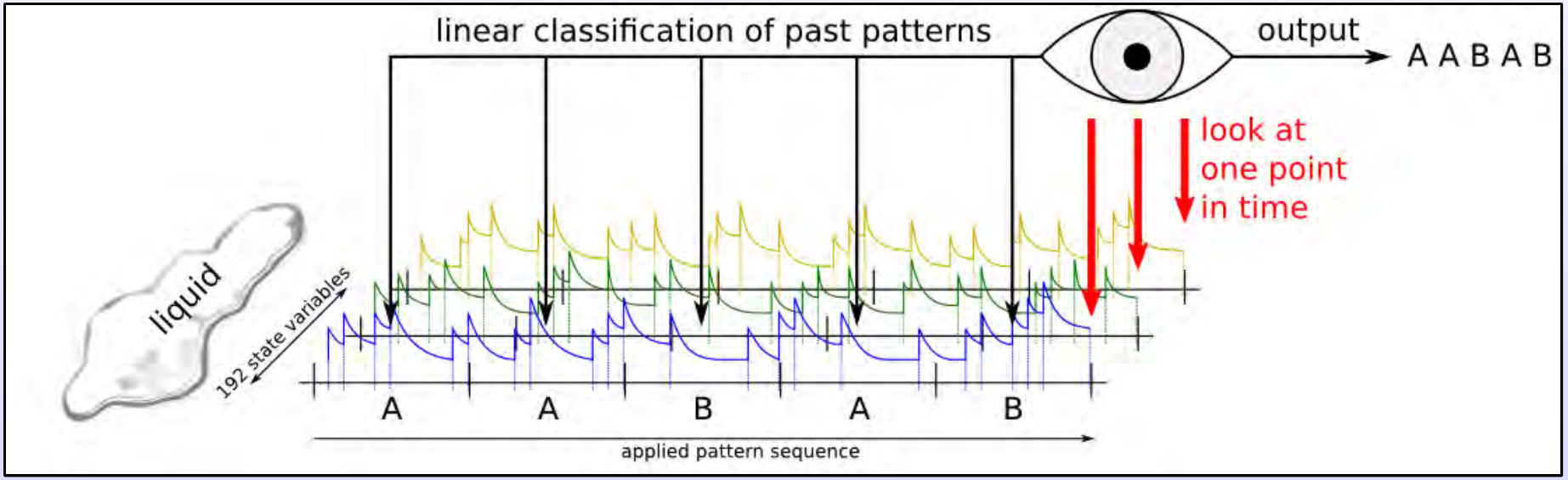


Attractor Dynamics in a Modular Network Model. Mikael Lundqvist, Martin Rehn, Mikael Djurfeldt, Anders Lansner. Network: Computation in Neural Systems, 17, 253-276, 2006.
Hardware Implementation: M. Petrovici, D. Bruederle



On the compuntational power of circuits of spiking neurons. W. Maass, T. Natschlaeger, H.Markram. Journal of Physiology (Paris), 2004.
Hardware Implementation: J. Bill, S. Jeltsch, B. Vogginger, M. Albert, M. Petrovici



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Special Thanks to

Script Contributions and Experiments

Marvin Albert, Johannes Bill, Thomas Clayton, Sebastian Jeltsch, Jens Kremkow, Pradeep Krishnamurthy, Anders Lansner, Mikael Lundqvist, Mihai Petrovici, Bernhard Vogginger

Coordination of the `NeuralEnsemble.org` Initiative

Andrew Davison, Eilif Muller