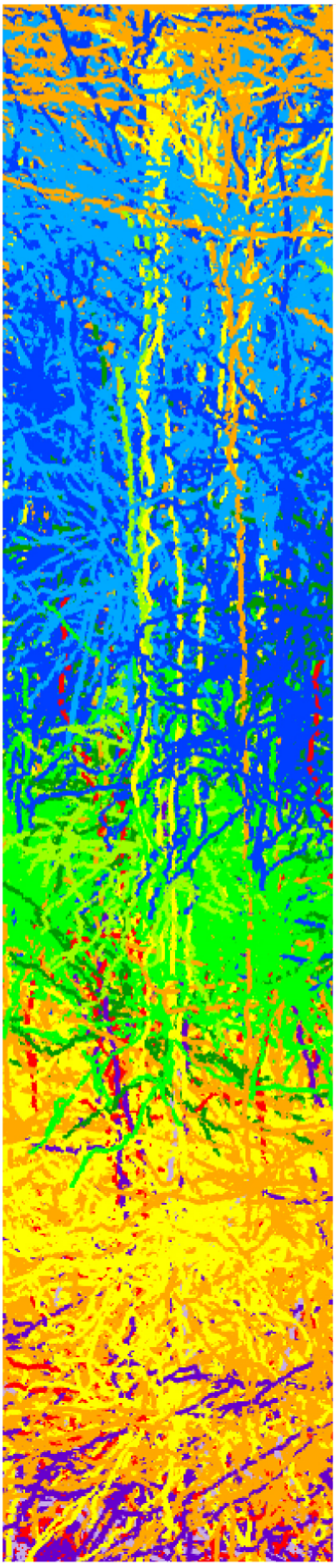
UNIVERSITÄT BONN

Neuroscience Lecture

Bonn Center of Neuroscience



Uncertainty-modulated prediction errors in cortical microcircuits

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To make contextually appropriate predictions in a stochastic environment, the brain needs to take uncertainty into account. Prediction error neurons have been identifited in layer 2/3 of diverse brain areas. How uncertainty modulates prediction error activity and hence learning is, however, unclear. Here, we use a normative approach to derive how prediction errors should be modulated by uncertainty and postulate that such uncertainty-weighted prediction errors (UPE) are represented by layer 2/3 pyramidal neurons. We further hypothesise that the layer 2/3 circuit calculates the UPE through the subtractive and divisive inhibition by different inhibitory cell types. We ascribe different roles to somatostatin-positive (SST), and parvalbumin-positive (PV) interneurons. By implementing the calculation of UPEs in a microcircuit model, we show that different cell types in cortical circuits can compute means, variances and UPEs with local activity-dependent plasticity rules. Finally, we show that the resulting UPEs enable adaptive learning rates.

May 15, 2023, 12:00 p.m.

Epileptology, Seminar Room 266/83, Ground Floor

Find more talks

If you would like to meet with the speaker, please contact:

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