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Towards brain-inspired computing with spin-torque nano-oscillators JULIE GROLLIER, JACOB TORREJON, MATHIEU RIOU, CNRS/Thales, Palaiseau, France, VINCENT CROS, CNRS/Thales lab, DAMIEN QUERLIOZ, Institut d'Electronique Fondamentale, Orsay, France, SUMITO TSUNEGI, AKIO FUKUSHIMA, HITOSHI KUBOTA, SHINJI YUASA, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan, GURU KHALSA, MARK D. STILES, National Institute of Science and Technology (NIST), Gaithersburg, USA — The brain displays many features typical of non-linear dynamical networks, such as synchronization or chaotic behaviour. These observations have inspired a whole class of models that harness the power of complex non-linear dynamical networks for computing. In this framework, neurons are modeled as non-linear oscillators, and synapses as the coupling between oscillators. These abstract models are very good at processing waveforms for pattern recognition or at generating precise time sequences useful for robotic motion. However there are very few hardware implementations of these systems, because large numbers of interacting non-linear oscillators are indeed. In this talk, I will show that coupled spin-torque nano-oscillators are very promising for realizing cognitive computing at the nanometer and nanosecond scale, and will present our first results in this direction.

Julie Grollier
CNRS/Thales, Palaiseau

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