

Non-Volatile Memories: from storage to machine learning applications

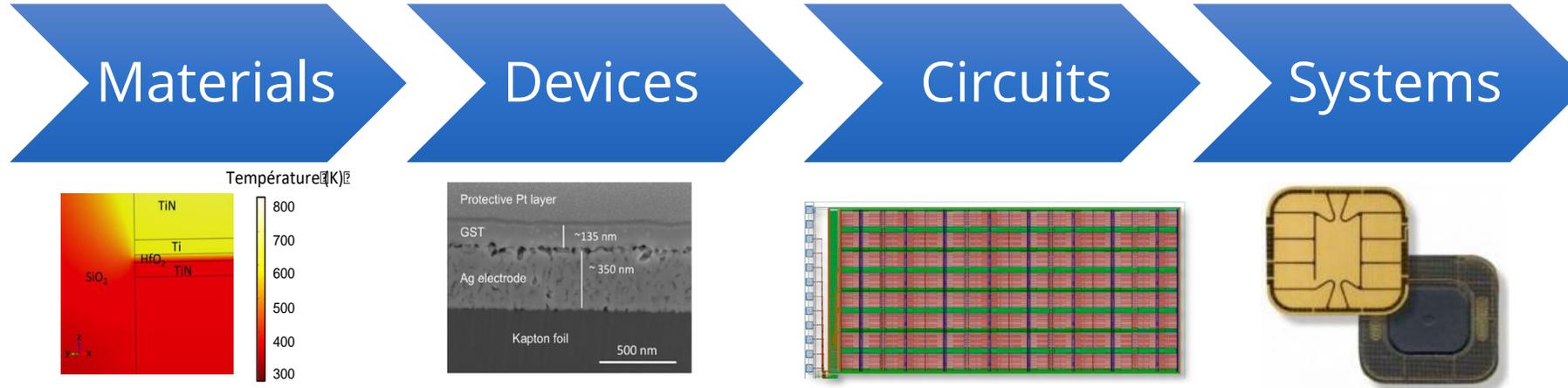
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Positioning & main topics

Transversal skills on the whole chain from materials to systems
for **Embedded memories**



Topic 1 : Study of reliability under external stimuli

Characterisation, physical modelling, reliability

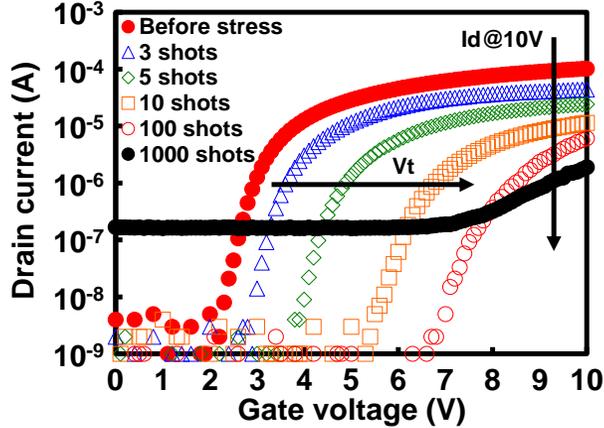
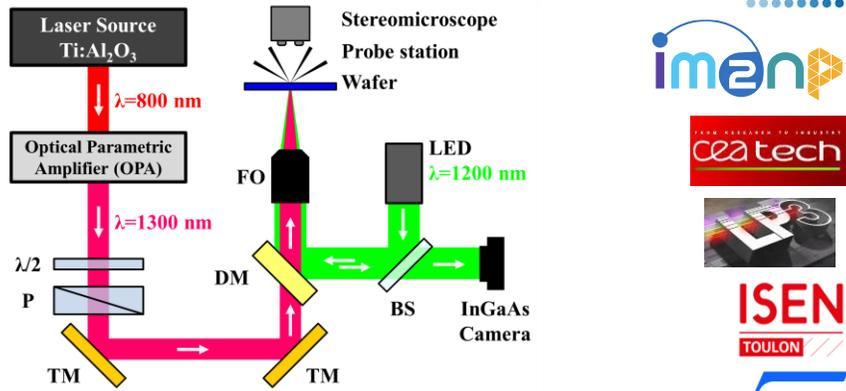
Topic 2 : Development of innovative solutions

Flexible electronics, compact modelling, circuit conception

Security of memory devices

Study of eFlash memories
robustness under laser irradiation

Projet **RESET** **A*Midex**
Initiative d'excellence Aix-Marseille



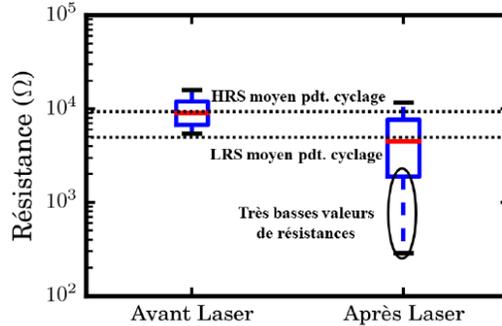
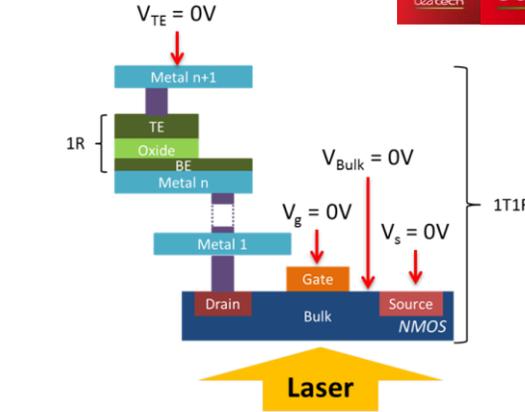
M. Chambonneau *et al.*, *Appl. Phys. Lett.*, 2017

V. Della Marca *et al.*, *IRPS*, 2016

Security characterisation of emerging NVM

Thesis Alexis Krakovinky

OxRRAM memories

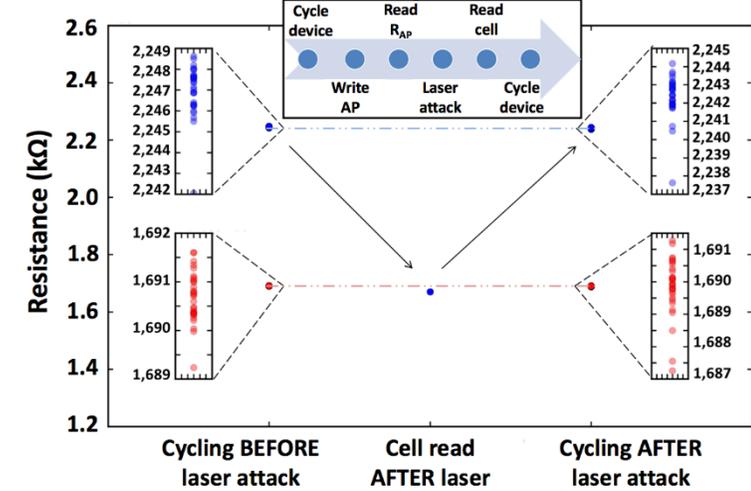
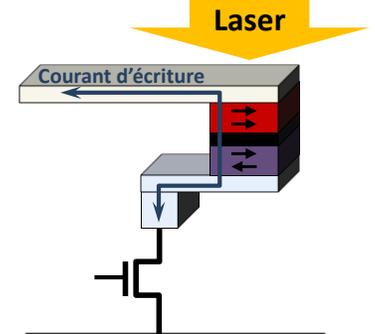


A. Krakovinky *et al.*, *ICMTS*, 2016

A. Krakovinky *et al.*, *IOLTS Conference*, 2017

Thesis Mounia Harari

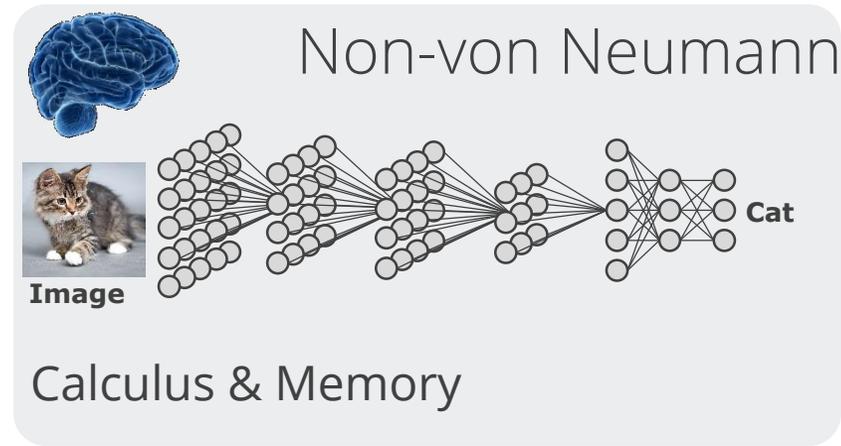
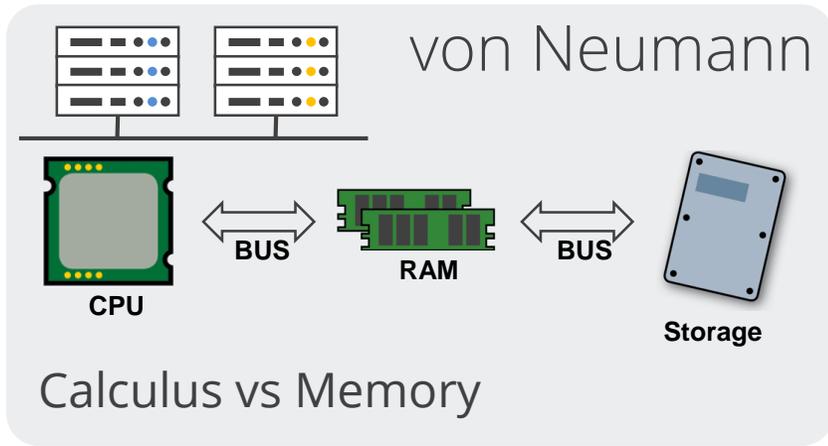
STT-MRAM memories



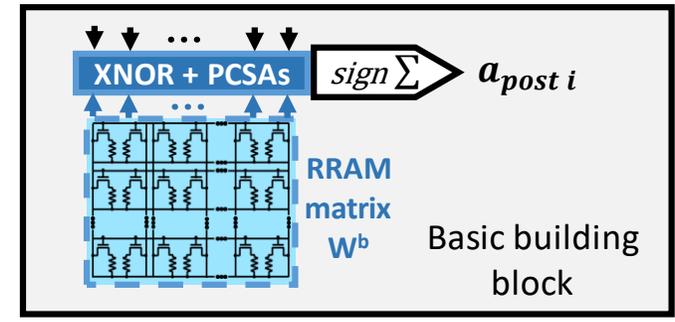
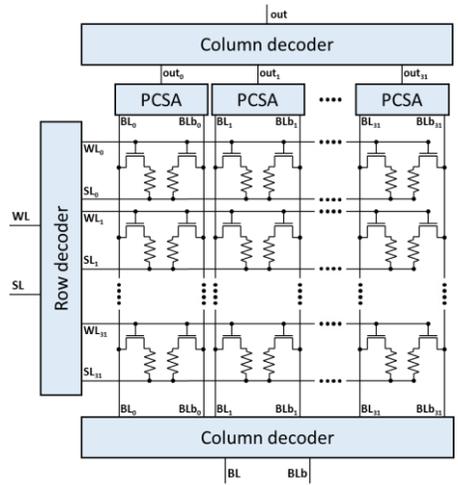
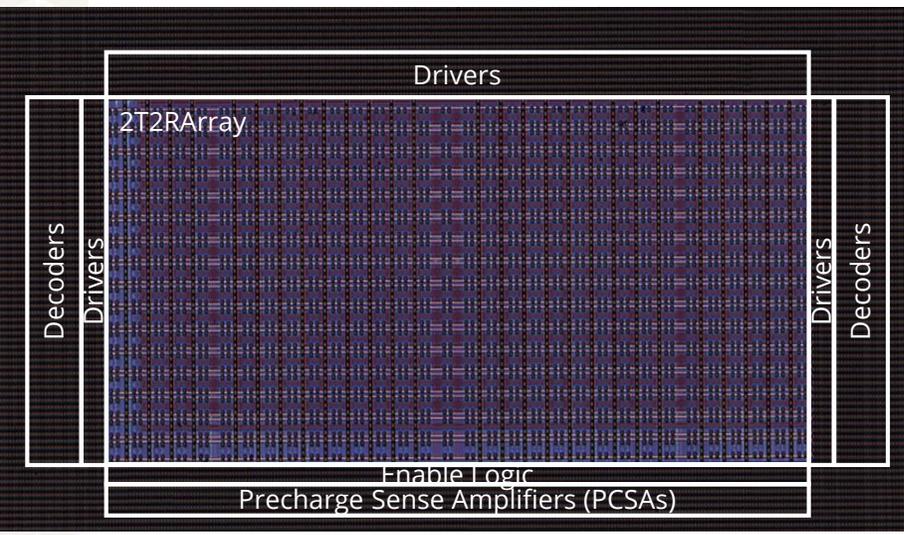
M. Kharbouche-Harrari *et al.*, *IOLTS*, 2018 & 2019

M. Kharbouche-Harrari *et al.*, *ISCAS*, 2019

Neuromorphic circuits based on resistive memories



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M. Bocquet *et al.*, **IEDM**, 2018 A. Laborieux, *et al.*, **IEEE TCAS**, 2020
 T. Hirtzlin *et al.*, **IEDM**, 2019 T. Hirtzlin *et al.*, **Frontiers in Neuroscience**, 2019



Matériaux GST – PCM

- Thesis Corentin PIGOT

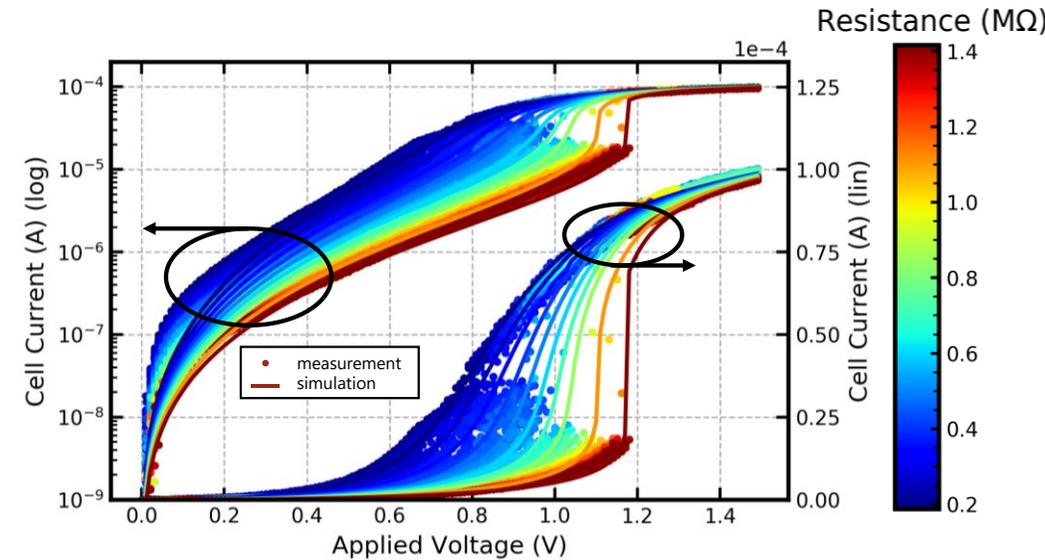
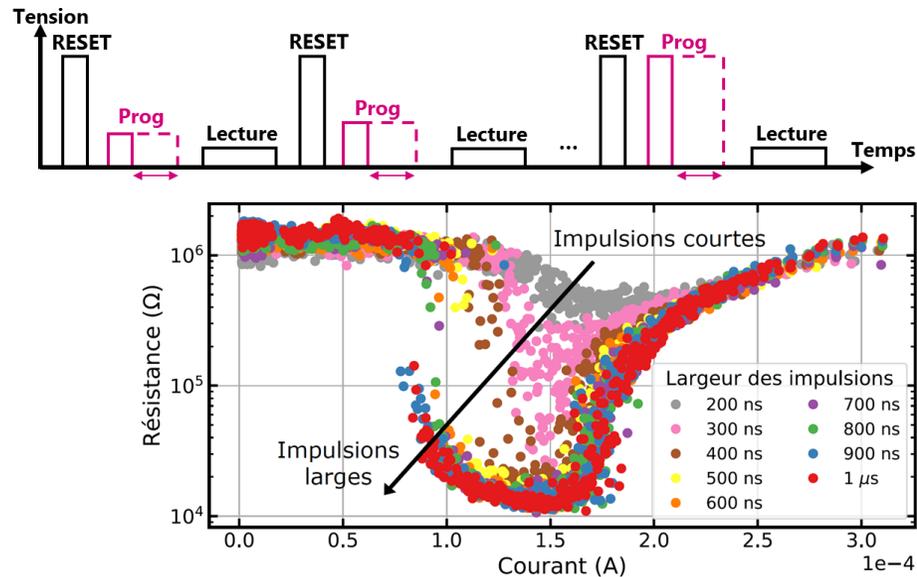


- Advanced electrical characterization

- ⇒ Compact modelling

- ⇒ Impact of programming parameters on electrical conduction

- ⇒ Effect of temperature on electrical conduction (from 75K to 500K)



C. Pigot *et al.*, **JJAP**, 2018

C. Pigot *et al.*, **SSDM**, 2017

C. Pigot *et al.*, **IEEE TED**, 2018