Soutenance de thèse

Lundi 3 Juillet

14 h, Amphithéâtre C2N

Energy-Efficient Memristor-Based Artificial Intelligence Accelerators using In/Near Memory Computing

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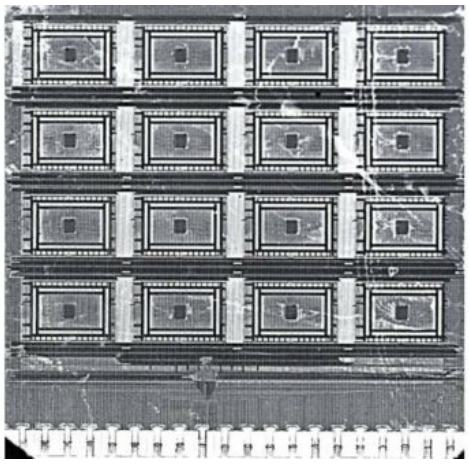
Abstract :

Artificial Intelligence (AI) is increasingly impacting our daily lives, promising transformative changes across numerous societal domains. However, AI faces two major hurdles : energy efficiency and trustworthiness. High energy demands of AI contribute to global carbon emissions and limit its usage in resource-limited environments. Meanwhile, AI's 'black box' nature raises concerns about its reliability, hindering wider acceptance. This thesis addresses these challenges by bringing together AI, computer architecture, and emerging technologies. Our key strategy is the development of specialized integrated circuits utilizing cutting-edge memristor technology, a nanoelectronic technology designed to support low-energy computational paradigms for AI models, specifically in resource-constrained contexts. We exploit memristors' non-volatility and in/near-memory capabilities for higher energy efficiency, especially in edge computing. Additionally, we incorporate Bayesian inference, an explainable AI technique, to enhance the transparency and trustworthiness of AI.



An optical microscopy image of our Memristor-Based Bayesian machine