09:40 – 10:00 Investigation and engineering of innovative phase-change alloys for next generation of Non-Volatile Memories targeting high array densities in AI applications: state of the art and future challenges
Speaker: Gabriele Navarro (**HDR, Senior Scientist-Engineer, CEA-LETI**)
Chair: Richard Davies
Location: IBS Seminar Hall

Abstract: *"With the advent of Artificial Intelligence and the Big Data era, there has been a significant increase in demand for high-density and high-performance memory solutions. Furthermore, in recent decades, we have observed a growing gap between processing speed and memory bandwidth, which has led to a major bottleneck in modern systems called "Memory Wall": processors spend increasingly longer waiting to retrieve stored data. The research for new memory technologies capable of ensuring scaling and incremental performance compared to existing technologies has no longer become an option but a keystone of next-generation computing systems.*
Chalcogenide-based memory solutions (i.e., Phase-Change Memory or PCM) have been adopted in the market to address the partial or total replacement of standard charge-based technologies (i.e., Flash memory), demonstrating: a) the possibility to address the challenge of the ultimate memory cell scaling (4F2 in Crossbar architectures); b) aggressive 3D integrations; c) high reliability compatible with the strictest specifications of the automotive market.
Phase-Change Memory performances rely on the material properties of the integrated chalcogenide alloy. The investigation and then the tuning of such properties, like the structural features, the crystallization kinetics and the stability at high temperature, made this technology capable to address the specifications of each target application.
In this talk, I will present some recent investigations on innovative GeSbTe-based Phase-Change alloys, achieved through the combination of several physico-chemical analysis techniques. I will show how these results have been used to engineer the material integrated into the memory device, and the final effect on the device's characteristics and performance. Finally, I will introduce the future challenges of this technology, in particular for the next generation of embedded memory devices targeting AI applications."