

# Graphene-based Wireless Interconnects for Next-Generation Computing Systems

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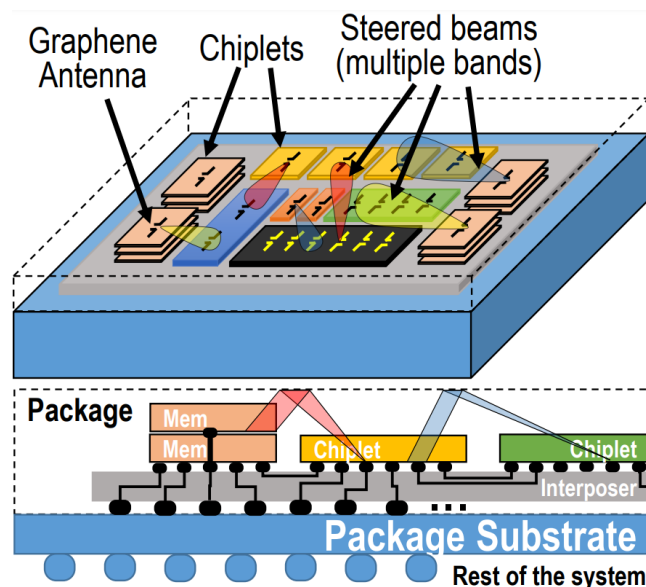
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Computing systems are ubiquitous in our daily life and have transformed the way we learn, work, or communicate with each other, to the point that progress is intimately tied to the improvements brought by new generations of the processors that lie at the heart of these systems. However, a common trait of current computing systems is that their internal data communication has become a fundamental bottleneck, rendering traditional interconnects insufficient and threatening to halt progress unless fast and versatile communication alternatives are developed [1-2]. In this context, graphene offers a set of very interesting properties for the creation of miniaturized and tunable antennas [3] and Radio Frequency (RF) circuits, which are proposed as key enablers of a novel approach: wireless chip-scale interconnects [1, 4]. In this talk, recent progress in the design of versatile integrated graphene antennas in the Terahertz band (0.1-1 THz) will be reviewed, stressing the capacity of achieving joint frequency-beam reconfigurability with a very small form factor. The potential impact of such a novel wireless strategy on the microprocessor industry will be illustrated through the analysis of (i) the opportunities that this new paradigm opens at the computer architecture level, and (ii) the technological challenges that need to be overcome along the way.

## References

- [1] S. Abadal *et al.*, IEEE Wireless Communications Magazine (2022).
- [2] S. Rodrigo *et al.*, IEEE Micro, 5 (2021) 48-56.
- [3] S. E. Hosseinijad, IEEE Transactions on Nanotechnology, 1 (2019) 734-746.
- [4] M. Imani, S. Abadal, P. Del Hougne, Advanced Science (2022).

## Figures



**Figure 1:** Schematic diagram of a multi-chip computer architecture and whose interconnect fabric is composed of a wired network within the computing package augmented with graphene-based agile wireless links.