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Short biography

Aristide Lemaître received his Ph.D degree in 1999 at the University of Paris 6, for his study of the magneto-optical properties of II-VI diluted magnetic semiconductor heterostructures. He was then granted an individual Marie-Curie fellowship to investigate the optical properties of InAs quantum dots at the University of Sheffield (UK). He joined the CNRS-LPN, now C2N, in 2001 as a permanent researcher. His research activities are focused on III-V heterostructure epitaxial growth and physics. For the last 15 years, he has conducted research on ferromagnetic semiconductors. He now investigates the growth and physics of topological insulators. He has a well-recognized expertise in high finesse microcavity epitaxy for quantum optics applications, as polariton manipulation, single photon and photon pair generation. His structures are at the state of art, yielding numerous collaborations with research groups in France and abroad. He is the coauthors of more than 360 publications in peer-reviewed journals.

Building quantum, layer by layer

In the 1960s, a major technological breakthrough revolutionized the development of nanomaterials for quantum applications: molecular beam epitaxy. This technique enables the fabrication of complex crystalline structures composed of stacked layers with nanometric thickness. The exceptional quality of these heterostructures now allows quantum phase coherence lengths to reach several microns, bringing us into the realm of mesoscopic physics, where purely quantum phenomena persist on a large scale. Today, these structures are at the heart of many quantum devices.

I will present this technique through the contributions of its pioneers before exploring some research directions in quantum optics made possible by these advances: single-photon generation, quantum simulation, nonlinear optics...

Keywords

Semiconductor Spintronics, MBE Heterostructures for Wave Engineering

References

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