Postdoctoral Researcher
Integrated quantum photodetection

Be a frontrunner in enabling medium-to-large scale quantum photonics applications by enhancing imec's integrated photonics platforms

What you will do

Quantum photonics is proposed as a vital, enabling technology for such disruptive concepts as an unbreakable quantum internet [1], and, more realistically, distributed sensor networks [2,3] and quantum enhanced sensing protocols [4]. For quantum photonics to progress from lab-based, proof-of-principle experiments to real life applications, aspects of integration (for scale-up, as well as realistic levels of control in non-lab environments) will need to be tackled. In some sense, this mimics evolutions in classical photonics, where integration has led to major breakthroughs in the past two decades. While photonics benefits from an inherent 'quantum' protection against noise by virtue of the energy scales involved (eV photons, meV noise), the difficulty of making photons to interact and to store them also limit the scope several quantum applications.
At imec, we offer some of the best integrated photonics technology suites in the world, both in the visible (SiN based) and NIR/telecoms regime (Si photonics). In this postdoc, you will investigate and develop one of the missing building blocks for scalable optical quantum information processing.
State-of-the-art single photon detectors now consist in superconducting nanowires but the cryogenic temperatures they demand are not compatible with the dissipation by all the other elements of an optical quantum circuit. Before that, avalanche single photon detectors have been the work horse of single photon detection. This project focuses on a new generation of single photon avalanche photodiodes (Spads) that exploits the capability of nanophotonics and the ISiPP 50G platform in particular. You will therefore work on perfecting those new detectors via proper doping level, optimized geometry and extensive characterization. The work has been initiated with the creation of a proper electrical model of spads, the fabrication of a first generation of dedicated spads and their operation in the Geiger regime.

What we do for you

We offer you the opportunity to join one of the world's premier research centers in nanotechnology at its Ghent (Belgium) site and within a close collaboration with the headquarter in Leuven (Belgium). With your talent, passion and expertise, you'll become part of a team that makes the impossible possible. Together, we shape the technology that will determine the society of tomorrow.
We are proud of our open, multicultural, and informal working environment with ample possibilities to take initiative and show responsibility. We commit to supporting and guiding you in this process, not only with words but also with tangible actions. Through imec.academy, 'our corporate university', we actively invest in your development to further your technical and personal growth. We are aware that your valuable contribution makes imec a top player in its field. Your energy and commitment are therefore appreciated by means of a competitive salary with many fringe benefits.

Who you are

- You have a Ph.D. degree in Photonics, Physics, Applied Physics, Electrical engineering and the like, with a solid grasp of both material science and electronics.
- Hands-on experience with photonics is a plus.
- Good knowledge of English (both written and spoken) is mandatory.
- We are looking for a good team player and your ability to work independently.

This postdoctoral position is funded by imec through KU Leuven. Because of the specific financing statute which targets international mobility for postdocs, only candidates who did not stay or work/study in Belgium for more than 24 months in the past 3 years can be considered for the position (short stays such as holiday, participation in conferences, etc. are not taken into account).

References:

[1] HJ. Kimble, *the quantum internet*, Nature 453, 1023 (2008)
[2] P. Komar et al, *a quantum network of clocks,* Nature Physics 10, 582 (2014)
[3] E. Khabiboulline et al, *optical interferometry with quantum networks,* Phys. Rev. Lett. 123, 070504 (2019)
[4] J. Aasi et al, *Enhanced sensitivity of the LIGO gravitational wave detector by using squeezed states of light,* Nature Photonics 7, 613 (2013)

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Register of Legal Entities Leuven
VAT BE 0425.260.668

Kapeldreef 75 – B-3001 Leuven – Belgium
Phone: +32 16 28 12 11 Fax: +32 16 22 94 00