SEMINAR: Cryogenic integrated photonics: where optical communication meets cryogenic computing

PAOLO PINTUS

April 21, 2023
12:00 to 13:00
Seminar Room

Abstract:
Integrated photonics is a promising technology that surpasses integrated electronics in both bandwidth and energy consumption. While photonic integrated circuits (PICs) have primarily been developed for optical communications, their potential is increasingly attracting interest from a wider range of applications, including emerging cryogenic classical and quantum computing systems. In this presentation, I will discuss the latest advancements in cryogenic PICs, specifically in relation to their use for interfacing with computing systems operating at low temperatures, such as single-flux-quantum logic circuits and superconducting qubits. Developing energy-efficient PICs that operate at low temperatures can enable scalable, low-cost, and power-efficient optical interconnections for achieving large data transfer rates while avoiding significant hardware complexity and heat load. When combined with the use of optical fibers to connect different temperature stages, cryogenic PICs can effectively interface with superconducting technologies, making them more accessible and opening a promising path towards scaling up classical and quantum cryogenic processors.

Biography:
Paolo Pintus is an Assistant Professor at the Physics Department of the University of Cagliari, Italy, and a Project Scientist at the Electrical and Computer Engineering Department of the University of California Santa Barbara, USA. He received his M.Sc. in Electronic Engineering with honors from the University of Cagliari in 2007, and his Ph.D. in Telecommunication Engineering with honors from the Scuola Superiore Sant'Anna in Pisa, Italy, in 2012.
After graduating, Dr. Pintus worked as a Research Fellow with the Scuola Superiore Sant'Anna from 2012 to 2016, and as an Associate Project Scientist at the University of California Santa Barbara from 2016 to 2022. He is a member of the review board for Nature, Optica, IEEE, and AIP publishing groups, and he serves on the technical program committees for several conferences, including the Optica Integrated Photonics Research Meeting (IPR), Photonics in Switching and Computing Conference, IEEE Si Photonics Conference (formerly GFP), and IEEE Photonic Society Summer Topicals. Dr. Pintus has co-authored over 100

scientific journals and conference papers, and has filed seven international patents.
Dr. Pintus has received several awards, including the European Anile-ECMI Prize for Mathematics in Industry, and he was a recipient of the Million Dollar International Quantum U Tech Accelerator. He is a Senior member of the IEEE Society, the IEEE Photonic Society, and a member of the Italian Society for Industrial and Applied Mathematics (SIMAI). His research interests center around integrated optics, silicon photonics, and computational electromagnetics.

Hosted by: Prof. Dr. Valerio Pruneri