

Welcome to **Optopub** in Stockholm!

Thursday 14 December-2023 17.30 – 21.00

RISE, Electrum at Kista, Kistagången 16 / Isafjordsgatan 22
Room Knuth, Elevator B to Level 6



Quantum Integrated Information Theory | Quantum Neuromorphic systems

Anastasiia Andriievskia, Researcher, Competencies Coordinator at ENCCS Swedish EuroCC Hub for High-Performance Computing, Department Computer Science, RISE

Quantum Integrated Information Theory as well as quantum and neuromorphic computing are emerging fields that explore the potential of quantum mechanics and brain-inspired architectures for information processing. In this talk, some of the recent developments and challenges in these fields will be reviewed and discussed how they can be information, which quantifies the degree of irreducibility of the causal structure of a system, and its possible applications to quantum systems and consciousness, will be introduced. Then some of the physical implementations of quantum neural networks, both digital and analog, will be presented and their advantages and limitations will be compared. Also, some of the experimental results that demonstrate the feasibility and performance of quantum neuromorphic computing will be highlighted. Finally, some of the open questions and future directions for this exciting interdisciplinary research area will be outlined.

The rise of Quantum Technologies: From Quantum Computing to Secure Quantum Communication

Laia Ginés, PhD, Researcher, Unit Nanotechnology, Department Smart Hardware, RISE

The past decades have witnessed the dawn of a new era, called second quantum revolution. A deeper understanding of quantum mechanics and its distinctive properties has paved the way towards crucial technologies, including quantum computing and quantum secure communication. Quantum computing harnesses the principles of quantum mechanics to perform complex computations at unprecedented speeds, solving problems that are intractable for classical computers. Simultaneously, quantum secure communication tackles the vulnerabilities of conventional cryptographic systems to quantum attacks. Quantum key distribution (QKD) employs cryptographic protocols, ensuring confidentiality of transmitted information. QKD leverages the laws of quantum physics to establish a secure key between different parties, making it robust against potential quantum attacks. In this talk, I will explore the foundational aspects of these groundbreaking technologies and I will emphasize their importance in today's world, specifically highlighting the measures governments are taking to accelerate the development of quantum technologies.

Entangled Photon Pair generation with periodically poled crystals

Max Widarsson, PhD, CEO, SLF-Svenska Laserfabriken AB

This talk gives an introduction to periodically poling and quasi-phase matching (QPM), in particular how they are the optimal choice for generating entangled photon pairs through spontaneous parametric down-conversion. We will also look at how we can alter the spectrum of the generated photons by engineering the crystal structure. The talk will finish with some other applications of QPM outside the realm of quantum optics.

followed by Optopub

IEEE Photonics Chapter invites everyone who pre-registered for food and drinks

Please, register here: <https://forms.office.com/r/ALwbT0rrwC>

No later than Tuesday 12th December before kl.13:00!

Welcome!

Lennart BM Svensson (PS) & Qin Wang (RISE) & Arne Alping (IEEE-Photonics Chapter)

