

**Primo Congresso NQSTI**

**Report of Contributions**

Contribution ID: 1

Type: **not specified**

## **Monolithic Integration of SiON-based photonic-circuit and silicon single-photon avalanche diode**

*Tuesday, 16 January 2024 09:00 (15 minutes)*

We present an efficient and CMOS compatible solution to realize a monolithic integration between SiN or SiON PICs (operating at 850 nm) and single-photon detectors, fabricated on the same silicon chip, operating at room temperature

<https://drive.google.com/open?id=14phwGTt9VtM0lZDtXB408m2yBO2LHfRt>

**Presenter:** ACERBI, Fabio (FBK)

**Session Classification:** Sessioni parallele

Contribution ID: 3

Type: **not specified**

## **Spontaneous 3D photonic crystals from ferroelectric domains in KTN:Li**

*Tuesday, 16 January 2024 09:15 (15 minutes)*

We discuss our experimental exploration of how spontaneous photonic crystals form supported by polarization supercrystals (PSCs) in near-transition potassium-lithium-tantalate-niobate (KTN:Li) and its implications for topologically-protected photonic waveguides and memory bits.

**Presenter:** DEL RE, Eugenio (Sapienza Università di Roma)

**Session Classification:** Sessioni parallele

Contribution ID: 4

Type: **not specified**

## **Silicon Photonic Integrated Circuit for Linear Optics Quantum Computing**

*Tuesday, 16 January 2024 09:30 (15 minutes)*

In Linear Optics Quantum Computing, the research aims to optimize a Silicon Photonic Integrated Circuit, focusing on the universal two-qubit Controlled-NOT gate prototype, which operates on a linear, coincidence basis with single-photon inputs.

<https://drive.google.com/open?id=1KQUxgrPyyXXEi3nWbmdir-Ciyh2fQKBd>

**Presenter:** DAO, Tu Ha (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Sessioni parallele

Contribution ID: 5

Type: **not specified**

## **Towards broadband quantum-limited superconducting parametric amplifiers for qubit read-out**

*Tuesday, 16 January 2024 09:45 (15 minutes)*

Ultra low-noise and broadband amplification is an essential ingredient to read out superconducting qubits. We present the development of Travelling Wave Parametric Amplifiers based on NbTiN films, towards the integration of a quantum-limited read-out chain.

[https://drive.google.com/open?id=1iYfLR\\_s4gFjPSbF\\_rFVveWaahxLWn2dD](https://drive.google.com/open?id=1iYfLR_s4gFjPSbF_rFVveWaahxLWn2dD)

**Presenter:** MANTEGAZZINI, Federica (FBK)

**Session Classification:** Sessioni parallele

Contribution ID: 6

Type: **not specified**

## **Superconducting Qubit Networks with highly entangled quantum phases appearing**

*Tuesday, 16 January 2024 10:00 (15 minutes)*

We have carried out a theoretical and experimental study of collective quantum dynamics of a superconducting quantum network (SQN) embedded in resonators.

[https://drive.google.com/open?id=1\\_n0IBwh7GHQ1mQXIub6VmiiE-Eff9Zc5](https://drive.google.com/open?id=1_n0IBwh7GHQ1mQXIub6VmiiE-Eff9Zc5)

**Presenter:** LISITSKIY, Mikhail (Consiglio Nazionale delle Ricerche)

**Session Classification:** Sessioni parallele

Contribution ID: 7

Type: **not specified**

## **From single superconducting components to integrated qubit circuits: Vertical Josephson junctions, low-loss superconducting resonators and high-kinetic inductance films**

*Tuesday, 16 January 2024 10:15 (15 minutes)*

The performance of single superconducting circuital components fundamentally limits the performance of complex multi-qubit circuits. We therefore optimise the design and microfabrication of elementary building blocks, maximising control and reproducibility and minimising microwave losses.

[https://drive.google.com/open?id=15EwTqjMfeHfLgOfqLjYrFtfG6\\_PhF4](https://drive.google.com/open?id=15EwTqjMfeHfLgOfqLjYrFtfG6_PhF4)

**Presenter:** AHRENS, Felix (FBK)

**Session Classification:** Sessioni parallele

Contribution ID: 8

Type: **not specified**

## Superconducting Qubit in a 3D Cavity

*Tuesday, 16 January 2024 10:30 (15 minutes)*

3D architectures with superconducting qubits are very attractive solutions for several quantum applications. We report here our recent progress in design and fabrication of such devices and in their characterization.

<https://drive.google.com/open?id=1oicw8eMYfuO3E29CqKhXB-c-SetsrrgW>

**Presenter:** TOCCI, Simone (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Sessioni parallele



Contribution ID: 9

Type: **not specified**

## Superconducting qubits control using FPGAs

*Tuesday, 16 January 2024 10:45 (15 minutes)*

We present an open-source tool designed for control and readout of superconducting qubits using Radio-Frequency System on Chip (RFSoc) FPGA boards. This tool facilitates swift calibration experiments and enables the deployment of gate-based applications.

<https://drive.google.com/open?id=1-bVOiubiMvm4QIlGWbv5PnX9cD5ToiUU>

**Presenter:** CAROBENE, Rodolfo (Università di Milano-Bicocca)

**Session Classification:** Sessioni parallele

Contribution ID: **10**

Type: **not specified**

## **Development of transmon qubits for quantum sensing and computing**

*Tuesday, 16 January 2024 11:30 (15 minutes)*

Quantum sensing with superconducting qubits opens new directions for exploring fundamental physics, offering unprecedented improvements in sensitivity. This presentation includes preliminary results and ongoing developments in transmon qubits specifically designed for this application.

<https://drive.google.com/open?id=1q-PhFx0kZ6s6-XU2-oViOOAfR2Bc7pOk>

**Presenter:** GIACHERO, Andrea (Università di Milano-Bicocca)

**Session Classification:** Sessioni parallele

Contribution ID: 11

Type: **not specified**

## **Oxide 2D-electron gas with engineered function properties for quantum physics and applications**

*Tuesday, 16 January 2024 13:00 (15 minutes)*

Oxide 2D-electron systems are characterized by extraordinary functional properties, including large Rashba-like spin-orbit coupling and unconventional superconductivity. In this contribution I will give an overview of possible application of oxide 2DEGs as topological and spin-orbit qubits [https://drive.google.com/open?id=19MRyNn\\_uqRGBspLuMsDmlyJbbODjg9DX](https://drive.google.com/open?id=19MRyNn_uqRGBspLuMsDmlyJbbODjg9DX)

**Presenter:** SALLUZZO, Marco (Consiglio Nazionale delle Ricerche)

**Session Classification:** Sessioni parallele

Contribution ID: 12

Type: **not specified**

## Atomtronics and spintronics with ultracold quantum gases

*Tuesday, 16 January 2024 13:15 (15 minutes)*

Ultracold quantum gases can be manipulated with arbitrary optical potentials to implement elementary circuits for atomtronics and spintronics applications. Here we present experiments performed on fermionic lithium atoms in Florence and bosonic spin mixtures of sodium in Trento.  
[https://drive.google.com/open?id=10u5Se9vKPeRQ6IQyZxgVx\\_MKfkcN2n9R](https://drive.google.com/open?id=10u5Se9vKPeRQ6IQyZxgVx_MKfkcN2n9R)

**Presenter:** DEL PACE, Giulia (Consiglio Nazionale delle Ricerche)

**Session Classification:** Sessioni parallele

Contribution ID: 13

Type: **not specified**

## Advancing Quantum Sensing through the Development of an Integrated Stack Utilizing Superconducting Devices

*Tuesday, 16 January 2024 16:30 (15 minutes)*

To advance quantum sensing we develop an integrated stack for microwave single-photon detection. Utilizing superconducting qubits, parametric amplifiers, and RFSoc-based quantum electronics, we aim to exceed current standards. Preliminary results and ongoing developments are presented.

[https://drive.google.com/open?id=1WWIHv8Q-7nFhLZrkQK-40N2pchP\\_GSuP](https://drive.google.com/open?id=1WWIHv8Q-7nFhLZrkQK-40N2pchP_GSuP)

**Presenter:** NUCCIOTTI, Angelo (Universita' di Milano-Bicocca)

**Session Classification:** Miniworkshop tematici