

GDR SOC2
Seminar on Quantum Computing
May 26, 2021

Meeting times: 13h30 – 17h00

Meeting link: tbd

Registration link (to be filled before May 25th):

https://docs.google.com/spreadsheets/d/1lhJl_KxTvOdKvQCPquguWLkYlxndka0l2-kmgCx-f8Y/edit?usp=sharing

Organizers:

Dr. Aida Todri-Sanial, CNRS, FR & Prof. Jean-Michel Portal, Aix-Marseille Université, FR

Abstract: For several years, quantum computing has emerged as a very active field of research. It started first with the physics community, trying to understand the underlying quantum mechanical phenomena in quantum dots. And today, the field has grown to account for research efforts from physics, mathematics, chemistry, computer science to engineering domains. Companies, governments, and research institutions are driving innovation to bring their quantum computing technology online, even though the number of qubits is still relatively low. But plans for quantum computers with hundreds and evens thousands of qubits have recently been announced. Doubling performance every year is now the benchmark for quantum computers as designers look to the IC circuit community for new design and automation tools for scalability. The industry is asking practical questions; for example, how can the current IC industry support the roadmap of quantum research? Can IC design community and tools help to correct the errors of qubits or enable quantum error correction? These are also some of the questions that will be covered in this half day seminar.

The session will highlight the crossover research needs, challenges, and prospects of quantum computing, starting from a theoretical background, hardware development, and cryogenic electronics for measurements to EDA design tools to advance the roadmap of quantum computing to quantum algorithms and applications. The session will be followed by a panel discussion with industry leaders from IBM France, ATOS, and TOTAL to exchange on recent developments and vision for the quantum computing roadmap. Currently, impressive accomplishments have been achieved in building quantum chips based on superconducting circuits as qubits that are accessible to the large community via the cloud. But such circuits constitute only one possible platform for quantum computing. Significant efforts are also underway to enable CMOS-based quantum computing. Consequently, many IC design methods can be of direct interest to drive innovation on CMOS silicon qubits.

Audience & Scope: The session will showcase progress on Quantum Technologies from theoretical concepts, algorithms & applications to design methods and hardware development with speakers from both industry and academia. By bringing renowned experts from multidisciplinary communities in quantum computing, the special session will not only give the current research landscape but will also facilitate the exchange of ideas and promote collaborations between these communities.

Tentative program on May 26th afternoon:

13h15 – 13h30 – Welcome Note

13h30 - 14h10 – Prof. Stephane De Bievre, University of Lille, FR

Title: Du surprenant hasard quantique à la cryptographie quantique

14h15 - 14h55 – Pierre André Mortemousque, CEA-LETI, FR

Title: Quantum hardware & Cryoelectronics

10min break

15h05 - 15h45 – Dr. Aida Todri-Sanial, CNRS-LIRMM, FR

Title: An overview on quantum firmware – Physical design for quantum computing

15h50 - 16h20 – Adrien Suau, University of Montpellier, LIRMM/CERFACS, FR

Title: Quantum algorithms & applications

16h25 - 16h45 - Panel with invited experts from Atos, Total, and IBM

Title: Round table discussion on recent progress and vision for quantum computing roadmap

Panelist: Dr. Cyril Allouche, ATOS, FR

Panelist: Dr. Marko Ransic, TOTAL, FR

Panelist: Dr. Olivier Hess, IBM, FR

Moderator: Dr. Aida Todri-Sanial, CNRS, FR