Quantum physics and condensed matter in advanced technology

	Nom	Company	Date	Titre	Resume
1	Sylvain Gigan	LightOn	21-janv	Computing with white paint? yes, we can.	I will describe our path, from fundamentals of light in complex media and biological imaging in our team at the physics department of ENS, to the founding of LightOn, a young startup that proposes to address modern machine learning challenges, leveraging on the same concepts, i.e. what I would call "optical computing with white paint".
2	Pascale Senellart & Shane Mansfield	QUANDELA	28-janv	Quantum optics with solid-state emitters: toward a quantum computing platform	In this presentation, we will discuss how conducting fundamental studies of light-matter interaction with semiconductor quantum dots, our team progressively developed useful devices for optical quantumtechnologies. These devices, namely efficient sources of single photons, are now commercialised by Quandela, a spin-off company created in 2017. With continuing progresses on the technological side, Quandela is now working on the development of an intermediate-scale quantum computing platform based on photons. We will discuss the assets and challenges of such a platform.
3	Vincent Ménoret	iXblue Quantum Sensors	04-févr	Industrial quantum gravity sensors: from research labs to volcanoes	Transforming a high-precision laboratory experiment into a commercial instrument is a long process. I will describe the challenges faced by iXblue Quantum Sensors (formerly Muquans) during the development of a cold atom absolute gravimeter, and show some examples of applications.
4	Dimitri Labat	Chipiron	11-févr	Portable IRM for medical imaging based on superconducting detectors	MRI is the most powerful and versatile medical imaging technique to date, yet it remains very inaccessible due to its cost and the technical constraints related to the use of high magnetic fields (of the order of Tesla) produced by a superconducting magnet. Chipiron is building an MRI system based on low-Tc SQUID, high sensitivity magnetometers with flat frequency response. These features allow the working field to be lowered to milliTesla while maintaining images of sufficient high quality for diagnosis.

5	Zaki Leghtas	Alice & Bob	18-févr	Quantum information with superconducting circuits	In this presentation I will introduce superconducting circuits and explain how they are being widely used to encode, protect and manipulate quantum information. The remarkable progress achieved over the last 20 years in this field has triggered a recent interest of the industrial sector, which I will briefly review.
6	Mathias VAN DEN BOSSCHE	THALES	25-févr	Satellite Quantum Information Networks - status and research need	Quantum communication networks will require satellites to allow efficient long distance links. This presentation introduces key concepts in quantum communications, and then draws the focus on quantum information networks (QIN) that will allow generic quantum state transfers between processors or sensors, or both. The overall architecture principles of QIN systems are detailed, critical enabler and key performance drivers are identified. The state of the art for the various elements is presented, and the progress needs in specific domains to go beyond proof of principle are identified.
7	Pierre Jouy	IrSweep	11-mars	Micro-second reaction monitoring with broadband quantum cascade lasers	High time resolution broadband spectroscopy is the key to monitor many fast chemical or biological reactions. A plethora of application can benefit from such information, ranging from biology research laboratories to industrial producers of combustibles and passing by pharmaceutic manufacturers. At IRsweep, we use dual frequency comb systems based on quantum cascade lasers to reach state of the art performances for our mid-infrared spectrometer. I will present the physics behind this technique, the challenges and future required developments as well as some applications while sharing my personal experience in the world of a high tech start-up.
8	Ramy Shelbaya	Quantum Dice	18-mars	Is anything truly random ?	In a world where much of our most valuable possessions can be accessed digitally, the security of our encryption systems is becoming increasingly crucial. Unfortunately, at the core of any encryptionsystems is a problem that we haven't been able to solve reliably: how to make random numbers? At Quantum Dice, we are working every day to create the world's first compact self-certified quantum random number generator. I will describe how a combination of cutting-edge quantum physics, mathematics and electro-optic engineering, is being used to solve one of cybersecurity's oldest problems.

9	Giulia Frucci	ID quantique	25-mars	Superconducting Nanowire Single Photon Detectors and systems	Over the past decade, superconducting nanowire single photon detectors (SNSPDs) have emerged as a key enabling technology for quantum optics and free-space optical communication. Superconducting detectors can outperform other photon-counting technologies in a variety of performance metrics such as detection efficiency, dark count rate, timing jitter, reset time, and photon-number resolution. In this presentation, I will discuss how IDQ has exploited SNSPD technology to build a single photon detection system for industry, quantum related applications and academic research.