

Dr Ole Kock, Technical Authority for Quantum Sensors at Teledyne e2v

Ole works with Mr Steve Maddox, Work Package Leader, to deliver WP12: Systems Engineering and Technology Transition, which aims to produce commercial products based on quantum technology.

He is the scientific lead at Teledyne e2v for the gravity sensor and atomic clock, and is working on the REVEAL project, which aims to design and construct a quantum gravimeter for subterranean surveying in civil engineering applications.

The REVEAL quantum gravimeter is expected to have twice the sensitivity as the current marketing-leading conventional gravimeter, meaning that surveys will be more detailed and accurate, and able to identify smaller and deeper objects, such as sinkholes, boreholes and mineshafts. These hazards can pose a health and safety risk for people working on the site and also after construction has taken place, as they can move or increase over time with catastrophic consequences, such as buildings opening up and bridges collapsing and subsiding.

How did you end up in the Quantum Technology Hub for Sensors and Metrology?

I completed my PhD, which was titled 'Magneto-Optical Trapping of Strontium for use as a Mobile Frequency Reference' at the School of Physics and Astronomy in 2013. This looked into the construction and development of compact and robust atomic clocks relying on optical frequencies. The long-term goal of my work is to build a compact atomic clock, for use as a transportable clock in space.

Following my PhD completion, I undertook a two-year Postdoctoral Fellowship at the University, during the time Professor Kai Bongs and his colleagues were bidding to become one of four hubs created as part of the UK National Quantum Programme. I was excited about the possibility of being part of a Hub which developed applications for the real world, and I assisted Professor Kai Bongs in drafting proposals.

During this time, I looked into further miniaturising the atomic clock, by shrinking the components. I created the Strontium Source, a new low power and low black body radiation atomic source, which was patented.

I also worked with PhD students on SOC2 (Space Optical Clock), a project which aims to create transportable optical atomic clocks to be eventually used in space.

How did you make the shift to working in Industry?

I always knew I wanted to work in Industry – it was simply a question of when, and where.

In my final year of my Postdoctoral Fellowship, I began applying to various companies offering technology research work, which related to my research work and interests.

During the bidding process to become part of the UK National Quantum Programme, we worked with three industry partners, one of which was Teledyne e2v. After learning more about the company, I took up their offer of a post as a Technical Authority for Quantum Sensors. I recognised that my experience at the Hub would be beneficial for my work at Teledyne e2v, and vice versa.

Tell me more about your work at Teledyne e2v.

I am now the 'expert' for Quantum at Teledyne e2v, and I give advice and guidance on the quantum world. I have worked there for three years, and I started in a team of only 3-5 people. The team has now grown to 20-25 people.

I lead the Science team, which is made up of five people. Over time, I have begun to move away from the technical world, and am now guiding my team in a more corporate direction. I work strategically to identify technologies that will be needed in the future, and I make sure our products align with our long-term goals.

I am currently developing gravity sensors, atomic clocks and satellites. My job requires me to investigate the potential markets and audiences for technologies, and to consider products as a business cases, rather than as academic, technical products.

How has the Hub helped you in your career?

Through my association with the Hub, I was able to work with key industry partners, such as Teledyne e2v, which was my opportunity and way into the industry.

We had access to a wide pool of researchers at the Hub, and we were strongly encouraged to think along industrial lines. I worked in small group of around 6 people, which included Dr. Yeshpal Singh and Professor Kai Bongs. We worked well together, as we were so familiar with each other's work.

It is extremely rare that you are able to apply most of what you have learned from your PhD into your actual job as well, and because of the opportunities of studying at the Hub, I have been able to do this in my career.

My long-term goal is now to bridge the gap between industry and academia.

What would you say to anyone thinking of applying to study at the Hub?

The Hub offers a unique opportunity to be directly and immersively involved with industry partners from the beginning. If someone has an interest in bringing research into the world, the Hub presents a great opportunity to have the breadth of contact with industry, which the Hub is able to offer.

The sheer number and different types of industry partners engaged with the Hub is one of a kind – from small and medium enterprises to large international organisations. Just being exposed to this is a huge advantage for those interested in developing and translating research to commercial applications.