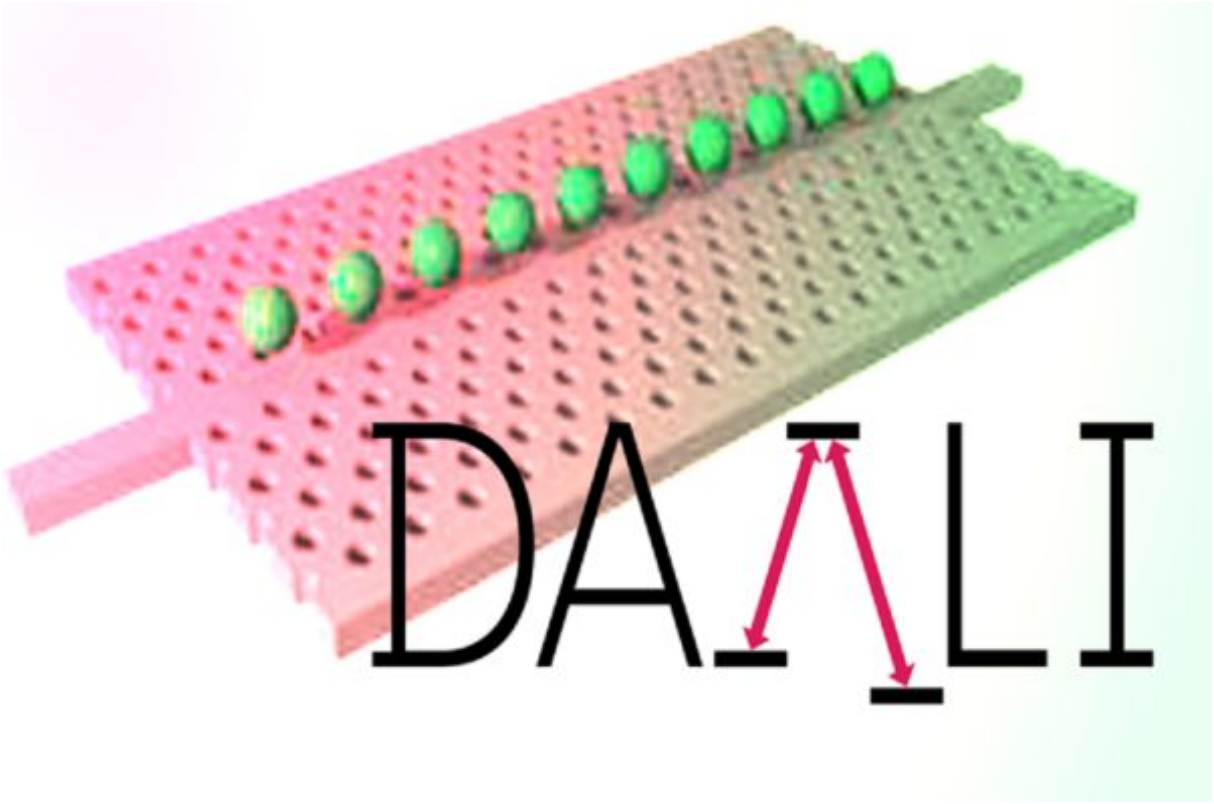

Kick-off of DAALI

An international team of researchers from ICFO, CNRS, Sorbonne University, MuQuans, Humboldt University and Weizmann Institute of Science come together to work on new protocols and platforms for quantum atom-light interfaces.

October 07, 2020

Developing efficient quantum atom-light interfaces is of paramount importance for applications such as quantum memories for light and nonlinear optics at the single-photon level. Despite many recent advances, reaching the performance level necessary for applications in general remains an outstanding challenge.

The EU-funded DAALI project aims to deliver exciting new solutions to this problem, such as by developing new physical platforms like nano-photonic interfaces that offer unprecedented atom-photon coupling strengths, and novel paradigms, such as based on atomic arrays in order to harness the power of wave interference.

To achieve these goals, the project brings together theoretical and experimental experts in

the fields of atomic physics, quantum optics and photonics. This international team of researchers comes from from ICFO, CNRS, Sorbonne University, MuQuans, Humboldt University and Weizmann Institute of Science. The three-year project of DAALI is coordinated by ICFO.

The objectives set by the project have been summarized in two main goals:

- Develop state-of-the-art interfaces between atomic media and nano/micro-photonic systems. Such systems offer excellent potential for scalability and large atom-photon coupling strengths. Moreover, the flexibility to engineer their spatial modes and dispersion enables new, powerful paradigms that have no obvious analogue in macroscopic interfaces.

- Demonstrate novel protocols for quantum memories and photon-photon gates. These protocols will take advantage of novel mechanisms such as those found in nanophotonic interfaces, i¿½selective radiance,i¿½ and strong atom-atom interactions. These novel eff cts can even enable error rates that scale exponentially better as a function of physical resou ces than previously known bounds.

During these three years, the project members will work together to solve the multi-disciplinary challenges needed to design and construct real systems that can maximally utilize and exploit these disparate concepts. The results expected by the end of the project have the potential to re-define the technological possibilities of light-matter interfaces, and might in the long-run lead to a re-writing of our textbook understanding of atom-light interactions and their realm of possibilities.

Group picture of the Daali consortium members