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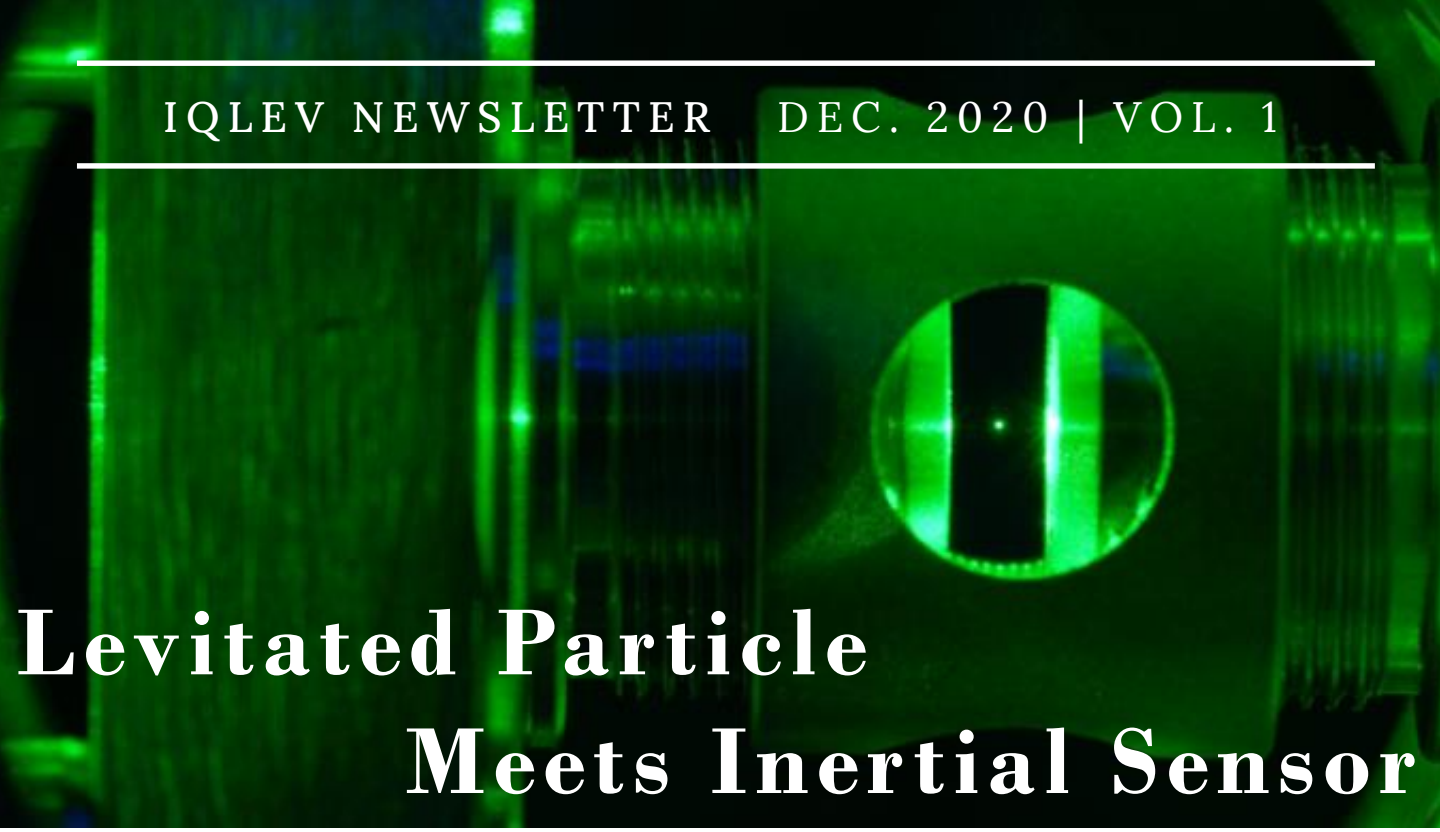

Levitated Particle Meets Inertial Sensor

Researchers of iQLev project explore the possibilities of building inertial sensors based on levitated particles

Since 1970s Arthur Ashkin and his colleagues for the first time reported the optical tweezer, which uses a tightly focused light beam to stably hold microscopic particles in three dimensions, it became a powerful tool to study the light-matter interaction and manipulate microscopic particles. Now, researchers from the iQLev consortium are starting to build inertial sensors based on levitated particles trapped by the optical tweezers or electrostatic and magnetic potentials.

"Before people mostly studied the dynamics of the trapped particle. Now we treat the trapped particle as a sensor to detect acceleration and rotation, which works exactly as an inertial sensor", says by Jialiang Gao, a PhD student from the photonics lab at ETH Zurich, "Compared to commercial MEMS inertial sensors, a sensor based on a levitated particle is less affected by the environment noise thanks to levitation. The optical tweezer provides a stable and flexible potential to manipulate the movement of the particle, for example, to cool the centre of mass motion of the particle. Meanwhile, our collaborators are also exploring the electrostatically and magnetically levitated particle in free space or on-chip. These factors all can help to enhance the performance of the inertial sensor based on levitated particles."

The EU-funded project "Inertial Sensing Based on Quantum-Enhanced Levitation Systems (iQLev)", including ETH Zurich, University Wien, University Innsbruck, ICFO and IXBlue, aims to develop a revolutionary sensing system for inertial navigation by combining quantum-enhanced detection and isolation from noisy environment offered by levitation. It will allow ground-breaking inertial sensing performance in the low frequency range to fit the current needs of the industry.

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