APC Colloquium

Thursday · July 2nd 2026 · 10:30
Salle Pierre-Gilles de Gennes, Bâtiment Condorcet

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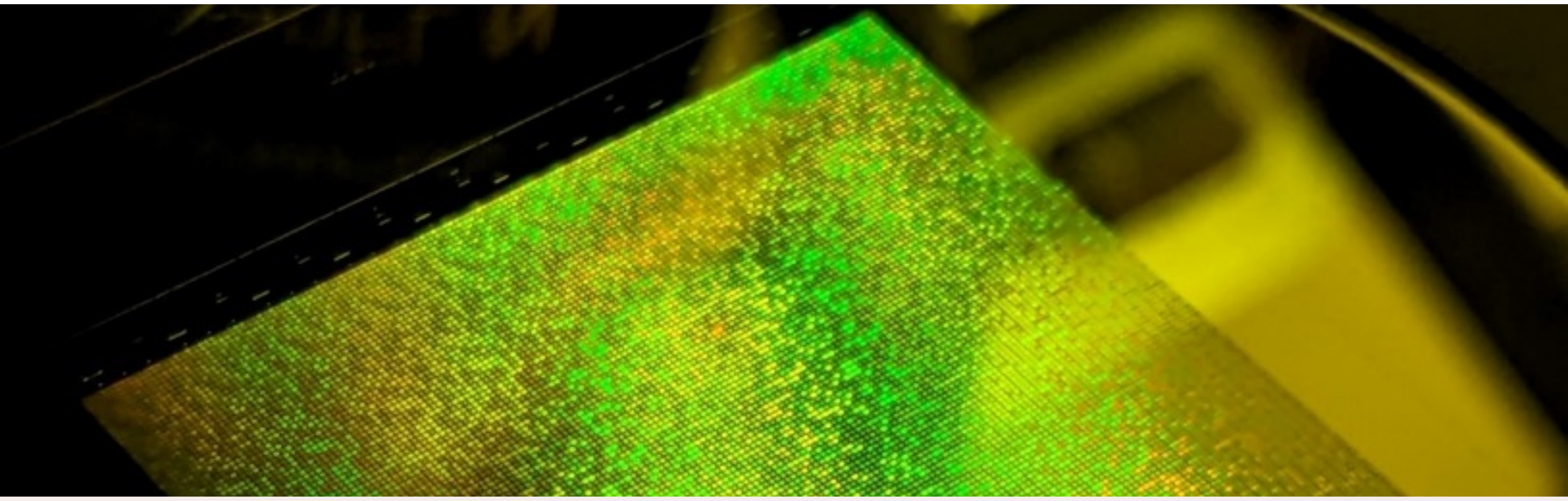
Observatoire de Paris · LUX · Paris, France

Development of Near Infrared and Visible Kinetic Inductance Detectors (KIDs) at Observatoire de Paris



RÉSUMÉ

Thanks to their unrivaled performance—particularly in terms of sensitivity, which can approach the quantum limit—combined with the unique physical properties of the superconductors from which they are made, superconducting devices can deliver ultimate performance across a wide range of applications, such as magnetometers, high-speed digital circuits, quantum circuits, and ultra-sensitive detectors for electromagnetic waves ranging from far-infrared to X-rays and gamma rays. Among these detectors are KIDs (Kinetic Inductance Detectors).

For over a decade, we have been developing the optical kinetic inductance detectors (KIDs) at Paris Observatory for astronomical applications. Different KID geometries are being investigated such as vacuum plate capacitor-based LEKIDs in order to lower the intrinsic TLS noise, as well as the widely used interdigitated capacitor-based LEKIDs. All are based on the titanium nitride TiN superconductor featuring a critical temperature Tc ranging from 0.8 to 4.6 K. The lowest Tc is suitable for high performance detection whereas the highest Tc allowed us to highlight a new phonon-based phenomenon generated following photon absorption.

These studies have led to a first application, giving rise to the SPIAKID (Spectro-Photometric Imaging for Astronomy with Kinetic Inductance Detectors) project. This is a KID-based spectro-photo imager, which will be primarily dedicated to the observation and study of ultra-faint dwarf galaxies (UFDs) in the Local Group between 400 and 1600 nm. SPIAKID will use 130 x 130 pixel TiN-based KID arrays that we will be arranged in a mosaic of 4 arrays cooled down in a 100 mK dilution cryostat.

In this talk, we will provide an overview of our various ongoing studies and developments and the latest experimental results on optical and near-infrared KIDs. We will then present the SPIAKID instrument, focusing on the different stages of its development, in collaboration with the APC – University of Paris Cité.