

PRESS RELEASE

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A world first for the “3D Ultrafast Ultrasound Cardiac Imaging” ESPCI research project supported by *Fondation CNP Assurances*

Launched in April 2013, the ESPCI (*Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris*) “3D Ultrafast Ultrasound Cardiac Imaging” research project funded by *Fondation CNP Assurances*, made a major breakthrough with the development of a technique for forming ultrafast ultrasound images in three dimensions. In the long term, this technology will facilitate the development of faster and more effective diagnostic tools in oncology, cardiology and neurology.

Featured in an article published in the *Physics in Medicine and Biology* review which won the Roberts prize this year, the project allows researchers to generate imaging volumes of up to 5,000 images/second, offering 3D visualisation of blood flow in the human heart or the distribution of mechanical vibrations in heart tissue.

This drastic increase in the frame rate has already been demonstrated by ESPCI for 2D ultrasound imaging with the establishment of an imaging company in 2005. The higher frame rate offers fantastic opportunities for biomedical imaging in various domains. In oncology, better detection and identification of tumours will be possible, thus reducing the number of painful and potentially dangerous biopsies. In vascular medicine, small blood vessels can be detected with unprecedented sensitivity. In cardiology, it will become the only imaging technique for the visualisation of the entire heart and heart blood vessels, facilitating better planning for certain congenital illnesses in children and better understanding and treatment for chronic illnesses such as heart failure, which currently reduces life expectancy to five years when detected. Over the past three years, ESPCI researchers have sought to demonstrate that the concept of ultrafast ultrasound imagery could be extended to 3D imaging. They were the first to achieve this in the world and have validated their technique in humans by making the first 3D film of the human heart with several thousand images per second, shedding light on all turbulent blood flow in the chambers of the heart as well as mechanical vibrations constantly flowing through the walls of the heart at several metres per second.

Thanks to the commitment of visionary partners such as *Fondation CNP Assurance*, this long-term project with the end goal of developing an innovative, 3D diagnostic tool will have a long-term impact on French and international research as well as on treatment and care for people with heart conditions.

“The INSERM U979 ‘physics of waves for medicine’ team from the Langevin Institute at ESPCI has made a breakthrough in the development of major innovations in ultrasound imaging with ultrafast 3D imaging. There is enormous potential for the use of these tools in research in order to gain a better understanding of pathologies in cardiology, oncology and neuroscience”, explained Mathieu Pernot, INSERM Research Officer and Mickaël Tanter, INSERM Research Director at ESPCI.

About *Fondation CNP Assurances*

Working on major public health issues for over twenty years, *Fondation CNP Assurances* decided to step up its commitment in 2015, and to make the reduction of social inequality in health its priority by supporting national projects that are in-line with its values and involve young people. The foundation has a multiannual action programme with 4 million euros dedicated exclusively to the projects it supports. *Fondation CNP Assurances* is a signatory to the Business Patronage Charter drawn up by Admical.

About ESPCI

ESPCI is not only a leading innovative engineering school, but also a research centre with an international reputation generating innovation for industry. Founded in 1882 by the Paris Town Council, the "Nobel School" (6 Nobel Prizes) has been home to great and innovative scientific minds for more than a century: Pierre and Marie Curie, Paul Langevin, Frédéric Joliot-Curie, Pierre Gilles de Gennes and Georges Charpak are some of the illustrious contributors to the reputation of ESPCI, particularly internationally.

ESPCI is the only engineering school which trains the majority of its graduates to the highest level of excellence (70% of student-engineers become doctors of engineering): and holds the number one position on the Shanghai ranking of engineering schools. Interdisciplinary research – with collaborations between physicists, chemists and biologists – is its calling card, and the school files the highest number of patents of all of the top French schools (1 per week). Large numbers of innovative high-tech start-ups are founded each year on the basis of research carried out in the school's 15 laboratories, with the creation of highly skilled jobs and an appetite for international development.

ESPCI is a founding member of *Paris Sciences et Lettres* and the ESPCI – Georges-Charpak fund.

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