

## Press Release

Nantes, 2 October 2019

# Centrale Nantes celebrates the arrival of a high-speed, high-resolution camera at the Research Institute in Civil and Mechanical Engineering. Only a handful of such devices exist in the world today.

On 1 October, in the presence of Stéphanie Houel, Vice-President of Higher Education, Research and Innovation on the Regional Council of the Pays de la Loire, and Véronique Stephan, Director of Innovation, Research and Higher Education at Nantes Métropole, Centrale Nantes's Dynamic and Static Test Centre (CRED) officially celebrated the arrival within its walls of an exceptional camera. Co-financed by the city of Nantes, the Pays de la Loire region and the European Regional Development Fund (ERDF), this camera is unique in France, indeed in Europe, in an academic setting.

Julien Réthoré, senior CNRS researcher, of the Research Institute in Civil and Mechanical Engineering (GEM) at Centrale Nantes, initiated the acquisition of this ultra-fast camera. He gave the audience present a demonstration of the camera's remarkable capabilities. Julien Réthoré studies the formation of cracks in materials to improve the durability of structures. He joined the GEM team in 2016 via the regional Connect Talent mechanism, which was behind the financing for the camera.

Given the interest of his work for the development of the industry of the future and the strong links with local aeronautical and naval sectors, Nantes Métropole has supported Julien Rethoré since his arrival in 2017. This co-financing was adopted within the context of the Nantes Campus approach and Nantes Métropole's public policies on higher education aiming, in particular, at fostering talent, interdisciplinarity and internationalization.

The technical characteristics of the camera are impressive: 4 million images/second and a resolution of 8 million pixels. By way of comparison, at equivalent speed, ultra-fast cameras offer a resolution of around 40,000 pixels.

From a scientific and academic perspective, this new tool will help advance experimental research into the observation of physical phenomena at micro-metre and micro-second scale. Very little data is available on these scales.

By way of illustration, it is possible today via additive manufacturing - better known as 3D printing - to produce parts with complex geometry, but also so-called architected materials. They may consist of networks of small bars, creating a kind of 3D grid, for example. Those studied by Julien Réthoré have a very particular structure, known as quasi-periodic. According to his calculations, these materials should be able to "stop" the cracks produced by a shock. The camera offers the opportunity to observe the behaviour of these materials when the shock wave propagates through their architecture at several kilometres per second, to validate models and to improve the design to make them even more efficient. One can easily imagine the interest and applications of such a discovery for the building (earthquake resistance for example) and transport sectors (e.g. shock absorbers).

### About Centrale Nantes

Founded in 1919, Centrale Nantes is a French engineering school and member of the Ecoles Centrale Group. Its undergraduate, Master and PhD programmes are based on the latest scientific and technological developments and the best management practices. At Centrale Nantes, research and training are organised into three key areas for growth and innovation: manufacturing, energy transition and healthcare. With research platforms ranging from digital simulation to prototyping using full-scale models and an incubator with 20 years of experience in supporting start-up projects, the school has two major tools for innovation and creation, working hand in hand with industry. Centrale Nantes promotes its teaching and research capabilities at international level through around 100 partnerships with prestigious universities and schools worldwide.

Centrale Nantes welcomes 2,410 students, including 1,440 undergraduate students, 170 Executive Education and ITII degree apprenticeship students, 270 PhD students, 430 Masters students, and 100 Bachelor/Foundation Master students on its 40-acre campus.

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Press Contact: Christine Besneux – 02 40 37 90 01