



CYCLE DE CONFÉRENCES

Séminaire général du département de physique  
de l'École polytechnique

# IMAGE SCIENCE IN MEDICAL AND SECURITY APPLICATIONS



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Image science is a growing field of study that attempts to understand every aspect of the imaging chain from the physical principles governing the interactions between light and matter to the evaluation of images by physicians, scientists, or algorithms. Taking this broad viewpoint ensures that no link in the imaging chain is ignored when attempting to design imaging hardware or make optimal use of measurements in post-processing. Traditional measures of image quality based on modulation transfer functions and noise analysis tend to analyze only a single aspect of the imaging chain. An evaluation of the entire imaging chain is possible by considering the scientific task

or tasks that are performed using the images. Thus, to objectively define image quality, we consider the task to be performed, the image-formation process, the objects being imaged, and the observer (whether human or computer) performing the post-processing. In this talk, I will introduce the basic concepts of image science and cover applications of the methods to two medical applications: dose reduction in computed tomography (CT) and adaptive pre-clinical imaging. In addition, I will discuss image quality applications in treaty verification where nuclear imaging is used to verify the presence or absence of treaty-accountable items.

**JEUDI 16  
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**17H15-18H30  
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