Friday, 25\textsuperscript{th} October

9.40 – 10.40 AM, room E023

The beauty of Fourier imaging: compressive sensing and magnetic resonance tomography

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Magnetic resonance tomography allows the non-invasive characterization of structure and dynamics in the human body: as such, it has revolutionized medical imaging.

The information for a reconstruction is acquired, one measurement at a time, in Fourier space. I will explain how the “navigation” from one measurement point to the next in Fourier space can be accomplished by the switching of magnetic field gradients.

There is much freedom in choosing the precise arrangement of measurement points. In particular, when choosing a regular grid for the measurements, then image reconstruction boils down to a standard inverse Fourier transform.

It is, however, often possible to reconstruct an image based on a number of measurements that is much smaller than the number of pixels in the reconstruction! This is the subject of “compressive sensing”, to which I will give a very basic introduction.

Broadly speaking, this lecture illustrates the relevance of computer science to modern imaging technologies that are themselves becoming a driving force in science and industry.

Undergraduate or more advanced students from all technical subject areas are most welcome!