

Title: Hadamard spectral imaging

Abstract: Since the seminal work of Duarte et al., computational imaging based on digital micromirror devices and Hadamard patterns has been widely associated with the theory of compressed sensing. Less well known today is the concept of Hadamard spectroscopy developed in the 1970s. The concept is based on the so-called Fellgett's advantage, which is an increase in the signal-to-noise ratio obtained when multiplexed measurements are made. We will describe two recent attempts to utilise this concept in biomedical imaging applications. Firstly, we describe a passive hyperspectral imager based on a compact spectrophotometer. Secondly, we will describe a hyperspectral light sheet microscope based on structured light. In both cases, the hypercube must be reconstructed from the raw measurements by solving an inverse problem. This crucial step benefits from recent advances in data-driven algorithms. We will benchmark different strategies and address the problem of motion compensation and spectral unmixing.