

Light scattering of visible wavelengths in biological tissues limits the depth of penetration and causes a dramatic loss of resolution in deep tissue images in optical microscopy. The use of light from the second near infrared (NIR-II) window has shown to be a very promising approach to overcome these limitations, as this region of the spectrum presents a stronger forward component in the scattering anisotropy. However, measurements in large sized samples often fall in the yet uncharacterized ballistic to diffusion transition, where neither the Diffusion Approximation (DA) nor the ballistic model can accurately predict the propagation of light.

This thesis investigates the possibilities of Optical Projection Tomography (OPT) and Light Sheet Fluorescence Microscopy (LSFM) in the II near infrared window and equivalent low scattering media through the development of a set of novel computational tools and experimental approaches that help to understand the new perspectives and challenges that optical imaging researchers can expect when imaging in this new spectral window.

