MEDICAL PHYSICS SEMINAR SERIES

Mang Feng

Overcoming the challenge of concentric artifacts in spectral photon counting CT

Photon counting CT (PCCT) has demonstrated potential applications in both nonspectral and spectral CT imaging. A photon counting detector is usually built by tiling multiple semiconductor panels together. Due to some subtle variations in the physical characteristics of these panels, their response functions to the same input x-rays are not identical. After CT reconstruction, this inter-panel response variation leads to severe low-frequency concentric artifacts. This talk will present a physics-based method to correct for these artifacts. The method uses materials with known thicknesses and compositions to calibration for the panel-specific detector response functions, which are used to homogenize the outputs of the photon counting detector for PCCT reconstruction. This method was applied to a PCCT benchtop and a prototype C-arm-mounted PCCT system for interventional imaging. Both phantom and in vivo animal results show that the method successfully cleaned up artifacts in PCCT images for each energy bin, which eventually leads to high-quality and quantitative accurate material basis images.

Ruiyang Zhao

Motion robust high SNR liver fat quantification with flip angle modulated approach

Chemical shift encoded (CSE)-MRI enables quantification of proton density fat fraction (PDFF) as a biomarker of liver fat content. However, conventional 3D Cartesian CSE-MRI methods require breath-holding. A motion-robust 2D Cartesian sequential method addresses this limitation but suffers from low SNR. Thus, a novel free breathing 2D Cartesian sequential CSE-MRI method using flip angle modulated approach with centric phase encoding is developed to achieve liver fat quantification with low T1 bias, high SNR, and minimal blurring.

Monday, September 20

4:00PM (CT) via Webex

Seminar Link: https://bit.ly/3hCxdQF

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