Contribution ID: **128** Type: 海报展示

一种新的 **PCD** 电荷共享分析与补偿方法

摘要

光子计数探测器（PCDs）在获取计算机断层成像（CT）中的光谱信息方面具有显著优势。然而，它们的应用受到电荷共享和脉冲堆积的限制。在本工作中，我们提出了一种新的数学模型，用于研究电荷共享如何逐像素影响探测到的光子数值。基于一致探测器响应的假设，我们的模型根据电荷共享事件的来源和去向进行分类，并建立了入射光子数与探测光子数之间的关系。该模型表明，对于传统探测器而言，电荷共享补偿问题始终是病态的。然而，通过引入耦合计数器提供更多电荷共享的信息，可显著缓解该问题的病态性。我们初步采用 Levenberg-Marquardt 算法求解该问题。借助蒙卡模拟获得的数据，我们验证了该模型的正确性以及用于电荷共享校正的有效性。

关键词

光子计数探测器，能谱 CT，电荷共享，解析模型

Abstract

Photon counting detectors (PCDs) offer significant advantages in capturing spectral information in computed tomography (CT). Nevertheless, their application faces limitations due to charge sharing and pile-up. In this abstract, we proposed a new analysis about how charge sharing affected the detected counts of photons pixel by pixel. By assuming uniform charge sharing probabilities across all detector pixels, our model addressed diverse charge sharing events based on their sources and destinations, and established relationships between the numbers of incident photons and detected photon counts. Our analysis reveals that the charge sharing compensation problem was always ill-posed for conventional detectors. However, MEICC detectors provide a well-determined solution to this issue by providing coincidence counts of photons in more channels. We preliminarily applied Levenberg-Marquarelt algorithm to solve the inverse problem. Utilizing data obtained from a MEICC detector, we achieved stable and physically meaningful solutions while conventional detectors could not achieve. The results demonstrated that the impact of charge sharing has been effectively mitigated.

Keywords

PCD, spectral CT, charge sharing, analytical model

Author: 赵, 晟梓 (清华大学)

Presenter: 赵, 晟梓 (清华大学)

Session Classification: 海报展示

Track Classification: 02 海报展示: 海报展示