Hello, my fellow workers. Today I am going to talk about my favorite article. The title of the article is Optimal Energy Thresholds and Weights for Separating Materials Using Photon Counting X-Ray Detectors with Energy Discriminating Capabilities. The author of the article is Adam S. Wangand Norbert J. Pelc from Departement of Electrical Engineering, Stanford University. The article is published in the Physics of Medical Imaging of 2009, Vol. 7258.

The article contains six parts. The main idea of the article is to show that PCXDs offer a wealth of information about the object being measured that traditional energy interacting detectors cannot assess.

In the first part, the authors explain us that PCXD with energy discriminating capabilities ideally allow us to extract as much information as possible from photons that transmitted through the scanned object.

The second part is model. It is spoken in details about model of x-ray registration. It is specially noted that a sum of Poisson random variables is a Poisson random variable too.

The next part is maximum-likelihood estimator for binned data. Here mention was made of likelihood function with log-normalization and some important statistical formulas are given.

The following part is relaxation of abutment constraint. Special attention is paid to the case when adjacent bins have non-overlapping intervals, but these intervals do not necessarily abut each other.

The next part is weighted measurements. In this chapter, the authors generalize the concept of binning by allowing each detected photon to contribute a real value amount to each bin, depending on the photon’s energy.

In conclusion, the authors say that they have achieved two main results. The former is that relaxing the abutment constraint for binning thresholds can improve material decomposition by allowing some photons to be discarded. The latter result is that weights can be found in appropriate way so that our detector will operate like ideal detector.

The information of the article is extremely useful for my work.