Hello, my fellow workers. Today I am going to talk about my favorite book. The title of the book is Handbook of medical imaging. The authors of the article are Jacob Beutel , J. Michael Fitzpatrick (Vanderbilt University), Steven C. Horii (University of Pennsylvania Health Systems), Yongmin Kim (University of Washington), Harold L. Kundel (University of Pennsylvania Health Systems), Milan Sonka (University of Iowa), Richard L. Van Metter (Eastman Kodak Company). The book is published by Spie Press in 2000.

The book consists of two parts and twenty chapters. I want to abstract one section from the first chapter.  
The title of this X-ray interactions. The main idea of the section is to show that X rays (and gamma rays) interact with matter in several different types of interactions. Interactions, in general, can result in the local deposition of energy, and in some cases an x ray will exist after the initial interaction in the form of a scattered x ray, characteristic x rays, or annihilation radiation photons.

The authors explain us that there are several different types of interactions are the photoelectric effect: Rayleigh scattering, Compton scattering, pair production, and triplet production. The mechanism for each of these interactions is described below.

In the first subsection, it is spoken in details about *The photoelectric effect*. In the photoelectric

interaction, the incident x ray interacts with an electron in the medium. The incident x ray is completely absorbed, and all of its energy is transferred to the electron. If the electron is bound to its parent atom with binding energy *E*BE, and the energy of the incident x ray is given by *E*0, the kinetic energy

*T* of the photoelectron is: *T =* *E*0 –*E*BE*.* It is specially noted that If the energy of the incident x ray is less than the binding energy of the electron photoelectric interaction with that electron is energetically unfeasible and will not occur.

The most common x-ray production technology used in the vast majority of the radiology departments around the world, however, is the standard x-ray tube, which emits bremsstrahlung as well as characteristic x rays.

In the second part mention was made of Characteristic x rays. Special attention is paid to the case when If the kinetic energy of the bombarding electron is less than the binding energy of an orbital electron, ejection of the orbital electron is energetically unfeasible and will not occur

The information of the article is useful for my work.

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.