WHAT IS CLAIMED IS:

1. A method for detecting an attenuation coefficient of an object under inspection by use of an X-ray machine, a detector and a processor, the method comprising steps of:

performing detector response calibration based on a detector response of the detector obtained by an incidence of rays with known energy into the detector to obtain a detector response model by the processor;

obtaining a photon counting model of the detector between incident energy spectrum data of the detector and detected energy spectrum data of the detector based on the detector response model by the processor, the incident energy spectrum data of the detector being obtained by an X-ray spectrum from the X-ray machine, which projects the object under inspection and is attenuated by the object under inspection, and the detected energy spectrum data being an electrical signal obtained by interaction of detector crystal of the detector with photons of the incident energy spectrum and read out by electronic components of the detector; and

performing a deconvolution operation on counts of photons in respective energy regions in the detected energy spectrum data of the detector based on the photon counting model of the detector, to obtain real counts of photons in respective energy regions in the incident energy spectrum data of the detector while not count of photons in the entire energy spectrum, by the processor,

wherein the deconvolution operation is performed on the counts of photons in respective energy regions in the detected energy spectrum data of the detector for each detector unit and each incident angle based on the photon counting model of the detector, to obtain real counts of photons in respective energy regions in the incident energy spectrum data of the detector for each detector unit and each incident angle, by the processor, and all sets of the obtained data are combined to achieve multiple-energy region reconstruction of the attenuation coefficient of the object under inspection detected by the detector by the processor.

2. The method of claim 1, wherein the deconvolution operation is performed on the counts of photons in respective energy regions in the detected energy spectrum data of the detector by a method of direct solution and adding a constraint term, to obtain the real counts of

photons in respective energy regions in the incident energy spectrum data of the detector, by the processor.

3. The method of claim 1, wherein the deconvolution operation is performed on the counts of photons in respective energy regions in the detected energy spectrum data of the detector by an EM solution method, to obtain the real counts of photons in respective energy regions in the incident energy spectrum data of the detector, by the processor.

4. The method of claim 1, wherein the step of performing the detector response calibration comprises a step of simulating an energy deposition process in a photon detector of the rays with known energy according to metal fluorescence data.

5. A device for detecting an attenuation coefficient of an object under inspection, the device comprising:

an X-ray machine;

a detector;

a memory; and

a processor coupled to the memory, wherein the processor is configured for:

performing detector response calibration based on a detector response of the detector obtained by an incidence of rays with known energy into the detector to obtain a detector response model;

obtaining a photon counting model of the detector between incident energy spectrum data of the detector and detected energy spectrum data of the detector based on the detector response model, the incident energy spectrum data of the detector being obtained by an X-ray spectrum from the X-ray machine, which projects the object under inspection and is attenuated by the object under inspection, and the detected energy spectrum data being an electrical signal obtained by interaction of detector crystal of the detector with photons of the incident energy spectrum and read out by electronic components of the detector; and

performing a deconvolution operation on counts of photons in respective energy regions in the detected energy spectrum data of the detector based on the photon counting

model of the detector, to obtain real counts of photons in respective energy regions in the incident energy spectrum data of the detector, while not count of photons in the entire energy spectrum,

wherein the processor is further configured for performing the deconvolution operation on the counts of photons in respective energy regions in the detected energy spectrum data of the detector for each detector unit and each incident angle based on the photon counting model of the detector, to obtain real counts of photons in respective energy regions in the incident energy spectrum data of the detector for each detector unit and each incident angle, and combining all sets of the obtained data to achieve multiple-energy region reconstruction of the attenuation coefficient of the object under inspection detected by the detector.

6. The device of claim 5, wherein the processor is further configured for performing the deconvolution operation on the counts of photons in respective energy regions in the detected energy spectrum data of the detector by a method of direct solution and adding a constraint term, to obtain the real counts of photons in respective energy regions in the incident energy spectrum data of the detector.

7. The device of claim 5, wherein the processor is further configured for performing the deconvolution operation on the counts of photons in respective energy regions in the detected energy spectrum data of the detector by an EM solution method, to obtain the real counts of photons in respective energy regions in the incident energy spectrum data of the detector.

8. The device of claim 5, wherein the processor is configured for performing the detector response calibration by simulating an energy deposition process in a photon detector of the rays with known energy according to metal fluorescence data.

9. A non-transitory computer-readable storage medium having stored therein instructions that, when executed by a processor, causes the processor to perform the method of claim 1.