Hello, today I am going to talk about the development of digital X-ray detector for osteodensitometry.

The main aim of my project is to develop [fast-operating](http://www.lingvo-online.ru/ru/Search/Translate/GlossaryItemExtraInfo?text=%d0%b1%d1%8b%d1%81%d1%82%d1%80%d0%be%d0%b4%d0%b5%d0%b9%d1%81%d1%82%d0%b2%d1%83%d1%8e%d1%89%d0%b8%d0%b9&translation=fast-operating&srcLang=ru&destLang=en) X-ray detector implementing spectrometric method of counting X-ray photons to measure bone mineral density

At present, densitometers are not produced in Russia, although they were invented in the World long ago. Therefore, our task is not only to develop the device, but also to develop the detector, which will surpass the existing analogues in the world.

Densitometer is a device that allows us to determine bone mineral density in order to start early treatment of osteoporosis. Osteoporosis is a disease characterized by low bone density and increased risk of fracture.

It should be noted several variants of detector realization. There are three main ways of collecting information from the detector: an integrating mode, a counting mode and a spectrometric mode. When working in the integrating mode signal is proportional to the number of detected photons, but we cannot recover their original number. Counting mode allows us to distinguish each individual X-ray photon. Work in spectrometric mode means that we not only separate each individual photon, but also register its energy.

Use of spectrometric detectors allows us to obtain a higher signal to noise ratio and, therefore, to apply them at lower doses, which is especially important for public health screenings.

The detector consists of a scintillator and SiPM. The following requirements are applied to scintillator: it should be non-hygroscopic, bright, fast-acting, has a high density and atomic number and, most importantly, has a high energy resolution.

Using SiPM KETEK and scintillator YAP: Ce 17% energy resolution has been achieved at the energy of 59.5 keV. However, there is currently no clear answer what is necessary energy resolution of the detector because that depends on many factors. It is estimated that the energy resolution should be about 20% FWHM at energy of 40 keV.

To sum up, in the course of the work one produced detector based on the combination of SiPM - scintillator allowing us to reach the energy resolution of 17% at energy of 59.5 keV with high counting rate.