Good afternoon. My name is Dmitriy. Today I am going to speak about very important scientific event of last year – the detection of gravitational waves. My presentation is based on article from Science magazine dated this year February.

**I would like to start** with brief overview of gravitational waves concept and means of their detection. Then I will tell you about the discovery. Lastly, I will say a few words about the meaning of this discovery for scientific society.

So, **first of all**, what are the gravitational waves? They are ripples in the fabric of space and time. They were introduced in 1916 by A. Einstein in his famous general relativity theory, which explains gravitation as extortion of space and time. You can imagine them as periodical squeezing and stretching of the space. They are very weak, that's why they couldn't be discovered until last year. According to Einstein, a gravitational wave can emerge from colliding of two black holes.

**My next point is** how do scientists detect the gravitational waves. As they are very weak, we need to be able to measure very small changes of length, much smaller than atom size. Now we can do it with very precise interferometers – special devices which use interference of two laser beams to measure distances between two mirrors very accurately. Two of such devices are installed in LIGO – in states Washington and Louisiana, USA. Their size is about 4 km and they are able to measure distances with precision about 10^-19 m.

On the 14$^{th}$ September of 2015, in 9:50:45 UTC this facility detected significant disturbance, which later was confirmed as result of passing of gravitational wave though the Earth. The signal lasted only 0.25 sec and has frequency rising from 35 to 250 Hz. Signals detected in Louisiana and Washington had time offset equal to 0.007 sec, which is explained by the fact that gravitational waves spreads with speed of light.

Having analyzed signal, scientists found out the reason of the signal. It was collision of two black holes, which took place 1.3 billion years ago. Their masses were 29 and 36 masses of sun. After collision, the mass of resulting black hole was 62 masses of sun. And difference was converted into energy and radiated as gravitation wave. For a tenth of a second a collision shined brighter than all of the stars in all the galaxies. In the picture you can see the simulation of the collision.

**My next point is** meaning of that discovery. First of all, it proves existence of gravitational waves. Therefore, it proves Einstein's general theory of relativity on new level of precision. Besides, it provides the first evidence of black holes which does not depend on watching hot gas or stars rotate around them at long distances.

That brings me to the end of my presentation. Let me **summarize** what we looked at. We spoke about gravitational waves, means for detecting them, the first observation of this phenomena and its meaning for scientists.

**To sum up**, detecting of the gravitational waves is significant scientific discovery and it is likely to win a Nobel Prize soon. If you are any questions, I'd be happy to answer them right now.