

- warnings of hydrometeorological hazards and recommendations to the population about the rules of conduct in case of occurrence of these phenomena;
- on-line broadcast from surveillance cameras and other useful information and other.

Thus, developed structure and content of Web-site “Ecological portal of the Republic of Belarus” of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus will allow creating a server platform for informing the population of the Republic of Belarus, business entities and potential investors about the environmental situation in the country in certain areas.

SIMULATION OF RADIATION THERAPY USING PROTON AND CARBON-12

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The article describes simulation of charged particles track structure in the biological media and calculation DNA double-strand breaks.

Keywords: DNA, DSB, radiation therapy, proton, computer modeling.

The energy losses of charged particles as they pass through matter occur mainly because of their collisions with the electrons of the atoms. These losses are called ionization losses. For heavy particles dependence is described by Bragg curve. The shape of the curve is associated with a small energy transfer at the initial segment of the path, where the speed of the particle is large and the time of interaction is small. The loss of energy increases as the particle loses its speed, which leads to an even greater loss of energy.

There are several types of DNA damage. Double-strand breaks, in which both strands in the double helix are severed, are particularly hazardous to the cell because they can lead to genome rearrangements. It was noted that double-strand breaks is irreparable because neither strand can then serve as a template for repair. The cell will die in the next mitosis or in some rare instances, mutate. So, in radiation therapy, DSB are important as they lead to irreversible damage to cancer cells.

Geant4 (for GEometry ANd Tracking) is a platform for the simulation of the passage of particles through matter using Monte Carlo methods. Application areas include high energy physics and nuclear experiments, medical, accelerator and space physics studies.

Using the Gaint4 was found out the depth of penetration and energy loss for a protons with energies of 130 and 155 MeV, Carbon-12 ions with energies of 245 and 295 MeV per nucleon in water phantom and in the brain phantom. Also was calculated the DSB number per particle per micrometer for protons and for Carbon-12 ions in brain material, which is close to Bragg peak.

RECYCLING IS THE SOLUTION OF ENVIRONMENTAL PROBLEMS

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In this research I tried to give young people a chance to learn about companies in Belarus that recycle rubbish, to encourage and enable them to take part in different promotions, to discover how they can contribute to restoring natural resources and what can be done in this direction.

Keywords: recycle rubbish, nature, solution, environmental problems, pollutants.

To promote awareness among young people of the importance of their participation in various actions dedicated to nature protection.

To make people thinking and taking care about nature.

To inform people about the risk of suffering from special diseases.

To encourage young people to become involved in different promotions devoted to recycling.

If recycling is the solution of environmental problems, the earlier pupils know about the importance of it, the better. This is the hypothesis of my scientific research.

In my research I used such investigation methods as interviews, questionnaire, and analysis of the results of creative activity.

Why have I chosen this topic?

People constantly try to predict the date when the end of the world will come according to The Mayans, Aztecs and ancient Slavs calendars. But humanity doesn't notice that our planet is already slowly dying!

First of all, I've chosen this topic because I can't stay indifferent watching how people, especially teenagers, pollute the environment throwing away the rubbish on the way to school or to work.

Secondly, a lot of researches have confirmed the link of a wide range of diseases and air pollution. But detected effects may be the result of exposure to one or more air pollutants.

Practical use of this research is evident – to encourage children and adults to help our planet, to join us and work together to restore natural resources.

My research consists of introduction, conclusion, 2 main chapters and practical work. The chapter Recycling is a huge step to saving our planet includes information about types of recycling, waste recycling in Belarus and other countries in comparison, basic facts about recycling.

In chapter Recycling in the modern world and its types I speak about types of recyclable waste in details, name and describe the groups of waste, give contacts of different recycling companies .

In chapter Impact of the pollution on the living organisms I inform readers about effects of pollution on plants, human health and in details speak about the diseases, caused by the pollution in order to accent people's attention on the importance of the recycling, also in that chapter I speak in details about soil pollution.

I examined school books from the 5-th till the 11-th forms in different subjects trying to find some information about Recycling and unfortunately found very little. Belarusian Ministry of education should give urgent attention to the problem and take actions to find the solution. This information should be included in our books.

Thanks to the teachers of our gymnasium, pupils of 5-9 forms had classes dedicated to recycling in September 2017. I've spoken about the importance of recycling, participation in storing natural resources and helping our planet and the danger of the pollution. During my research about 60 pupils of our gymnasium were interviewed twice: in January 2017 and in January 2018. They were asked the following questions:

1. Do you always separate rubbish at home?
2. Have you ever been involved in volunteering?
3. Have you ever participated in eco-promotions?
4. Have you and your family ever donated some money to organizations which recycle rubbish?
5. Have you ever participated in paper recycling?
6. Do you find bonfires an exciting entertainment?
7. Do you often use special separating bins?

I also compared the results of the previous year questionnaire with current results.

I was hardly disappointed with the results of my first interview, but the results of the second interview pleased me a lot. So I can be sure that pupils of our gymnasium take care of our planet, but I think we should have classes dedicated to storing natural resources regularly.

Also I was in contact with my friend from the UK. I asked Sara about recycling in her country and I was surprised: almost everyone uses only separating bins, reuses paper or plastic, many of Englishmen decorate their gardens with handmade ornaments from the home waste. I'm sure that even adults can make mistakes in separating rubbish. I offer to check it during an interactive game.