

MW-GAIA: BRINGING THE MILKY WAY TO SCHOOLS 2021

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TOPICS COVERED

- The Milky Way as a Galaxy: the science and research background
- Dissemination of the GAIA science
- Bringing the research closer to the public
- Teaching the Milky Way in schools
- How to make teaching and science communication more inclusive

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Poster 6

ORGANIZERS



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Astronomy classes at the Astronomical observatory

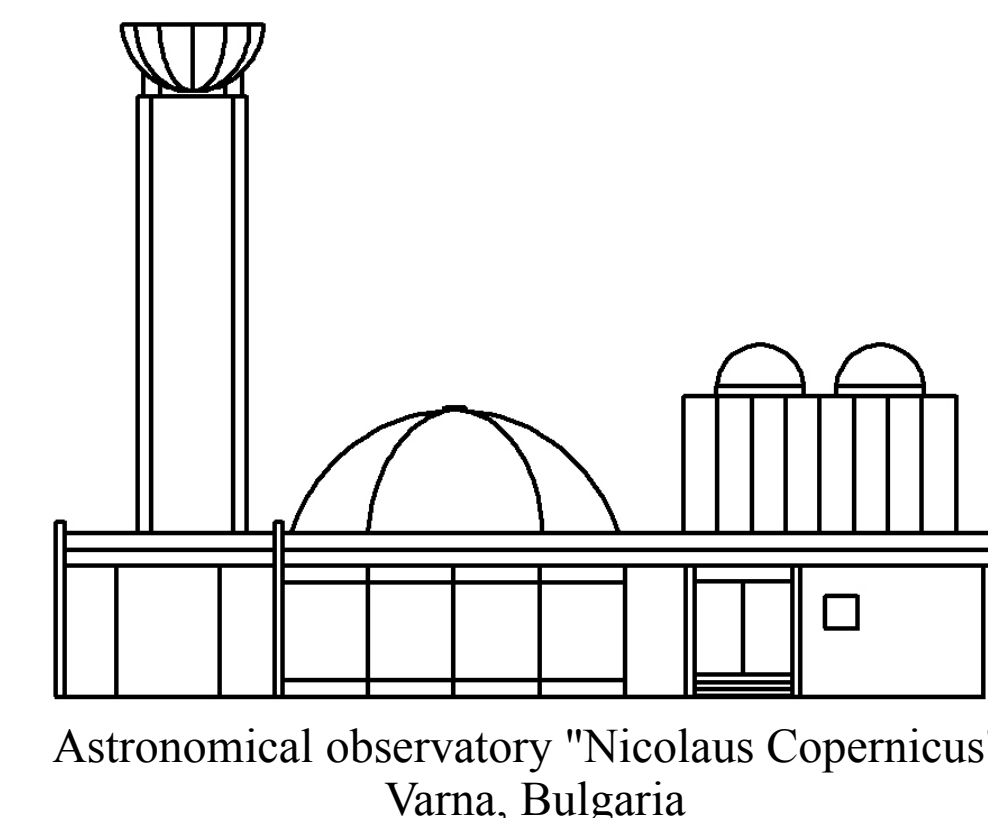
The Astronomical Observatory "Nicolaus Copernicus" is an educational institution that annually organizes Astronomy classes for elementary and high school students. Our main topics are exploring the starry sky, constellations - bright stars and Messier objects, Solar system, Milky way and Hubble classification. One of the best tools of learning and illustrating are the lessons in a dome-covered room with a planetarium projector by Zeiss. At the same time observations are organized in a nearby observatory (Avren), where light pollution is less. Observations are made both visually through binoculars or a telescope, and photographically.

This year's pandemic situation has necessitated the search for new tools to illustrate the knowledge of our galaxy - the Milky Way and the types of galaxies. For this purpose, we used platforms such as Galaxy Zoo, materials from the site of the GAIA mission, free open source planetarium and Google Quizzes. The latter are compiled into videos that students keep as a memory of their classes in a remote environment.

Here we will present some of the activities and tools we use during the classes to inspire students to look up on a clear night!



Activities during an astronomy class at the Astronomical observatory “Nicolaus Copernicus”



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Abstract: The Astronomical Observatory “Nicolaus Copernicus” is an educational institution that annually organizes extracurricular astronomy classes for elementary and high school students. Our main topics are exploring the starry sky, constellations, bright stars and Messier objects, the Milky Way and Hubble classification of galaxies, the Solar system. One of the best tools for learning are the lessons in a dome-covered room with a planetarium projector ZKP-1 by Zeiss. Observations are also organized in a nearby observatory (Avren), where light pollution is less severe.

Introduction:

During our classes we introduced the students to the topic of the Milky Way using our dome-covered room, and in our remote work we include all the fun examples that stay in the students minds and encourage them look for information themselves.

Here I will present some of the activities and tools we use during the classes to inspire students to look up on a clear night!

Exploring the Milky Way Galaxy:

Undoubtedly the most impressive way to understand the starry sky is its observation by students with the naked eye or binoculars during evening observations (Fig. 5). But due to the brightness of the city in which we live, observation of the Milky Way is impossible. That is why we use our planetarium (Fig. 1) to learn the constellations, to mark the difference in the brightness of the stars, to show the Milky Way, its satellite galaxies (Large and Small Magellanic clouds) and the local group of galaxies. One activity during the planetarium classes is to tell myths and legends of the ancient peoples around the world who tried to explain the existence of the Milky Way. Since we are on the Balkan Peninsula, we never skip the legend of the Godfather's straw, passed down from generation to generation.



Figure 1 Dome-covered room with diameter of 10m and projector ZKP-1 by Zeiss (at the center) and images from our classes.

The nearest stars and the shape of our galaxy:

Once a month we set a day for astronomical tasks. In Fig. 2 you can see a task related to both the shape of the Milky Way and the distances in our galaxy. Each student is given a table with the nearest stars and a checkered sheet. The goal is for each of them to create a Cartesian coordinate system and graph each star's location from the table [1]. The result is amazement and surprise!

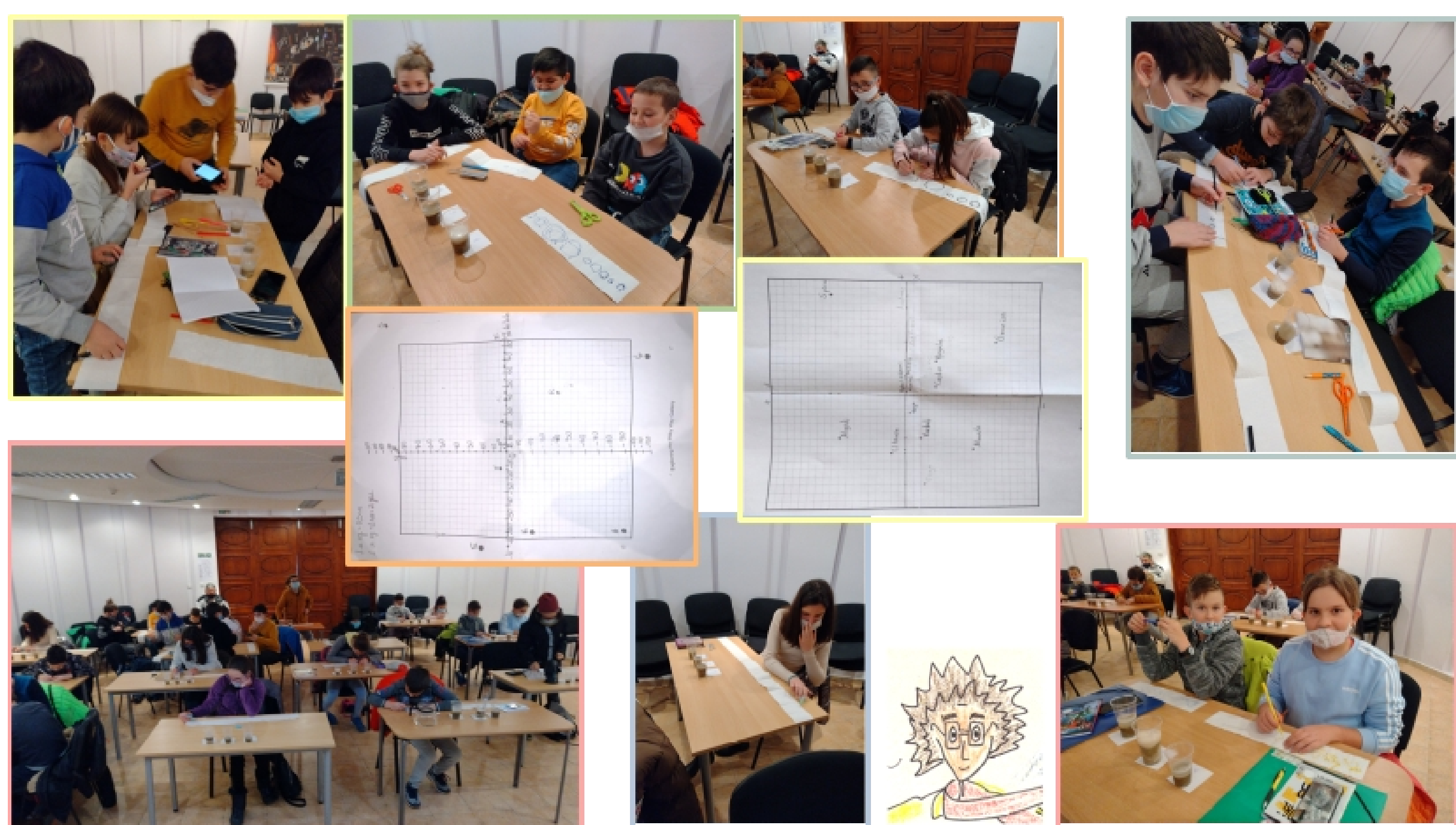


Figure 2. Students during the “Astronomical task” day and some of their results in the center.

Conclusions and Acknowledgments: The exercises that students perform during the extracurricular astronomy classes add to their knowledge of physics and astronomy. All the activities we organize are filmed and edited into videos which the students can keep as a collection of memorable moments from their astronomy classes.

I want to thank Dr. Eva Bozhurova for the inspiration she gives to our entire team!

Milky Way view from the Solar System :

To explain the way we see our galaxy in the sky, in our classes we often use the example of the pancake ([2], [3] Fig. 3). When we look down on the galaxy the same way we would look at a pancake we can see its flat side and can distinguish its center and spiral arms. We can also determine its type – a barred spiral galaxy. But our solar system is situated within the galaxy in such a way that from our point of view the Milky Way looks like a pancake seen from its side. That's why our galaxy looks like a long strip!

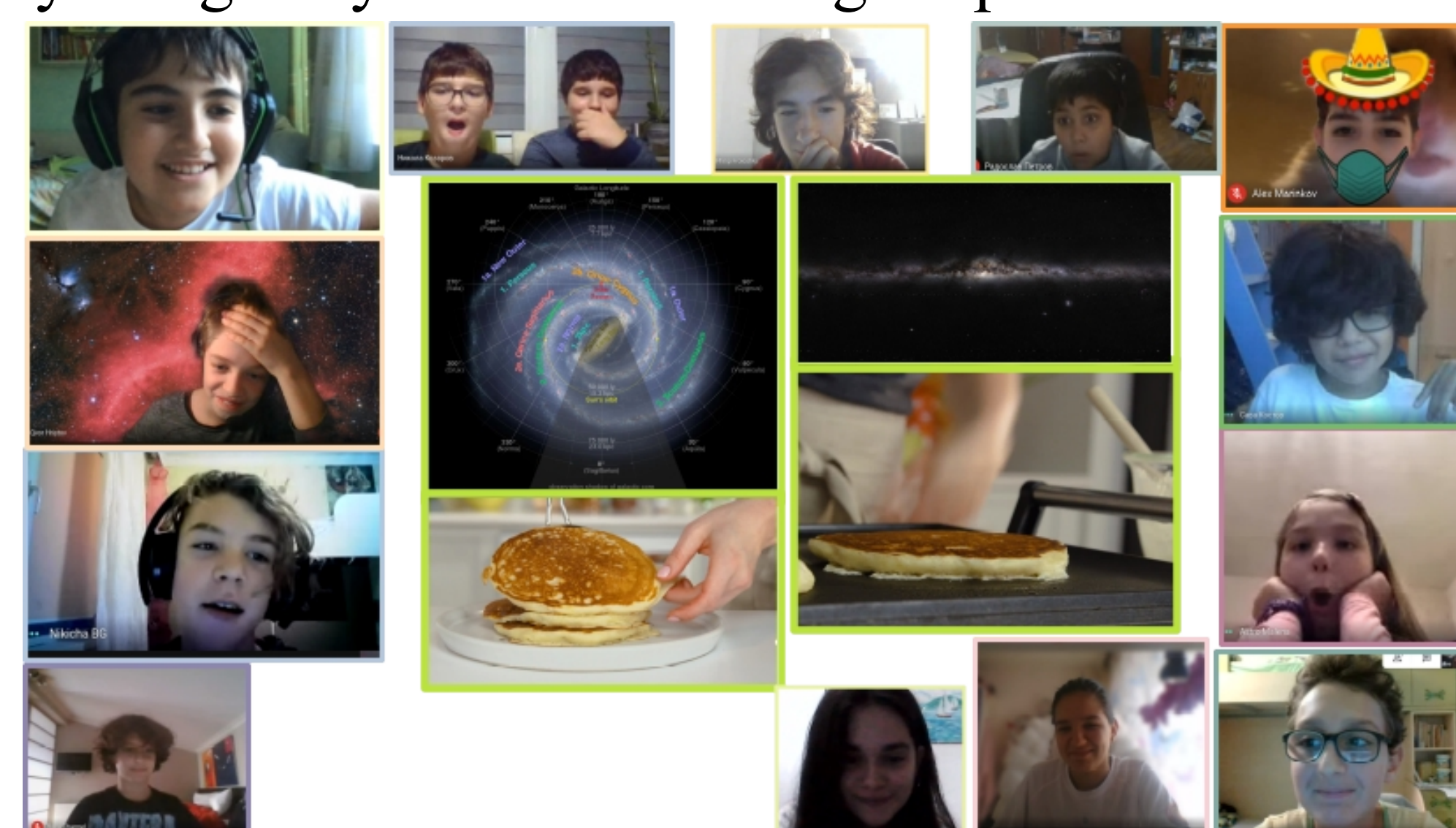


Figure 3. Remote work.

Open-air lesson:

Our observatory is located 50 meters from the beach, which gives us additional ideas for classes. The pandemic situation requires distance and fresh air, which is why this year we did an open-air lesson on constellations (Fig. 4). We divided the students into groups of two, each group had a star map from which to choose a constellation. Their task is to make their chosen constellation with the materials at hand while keeping in mind the color of each star! Once a team is ready with its own constellation, it has to guess the constellations of everyone else. Questions can be asked such as: Is there a known Messier object in this constellation and which is it? Is the constellation close to the projection of the Milky Way on the sky? Is the constellation a setting one or a non-setting one?

This exercise is the most complex and includes all the knowledge acquired during the class. It can be used for the end of the school year!

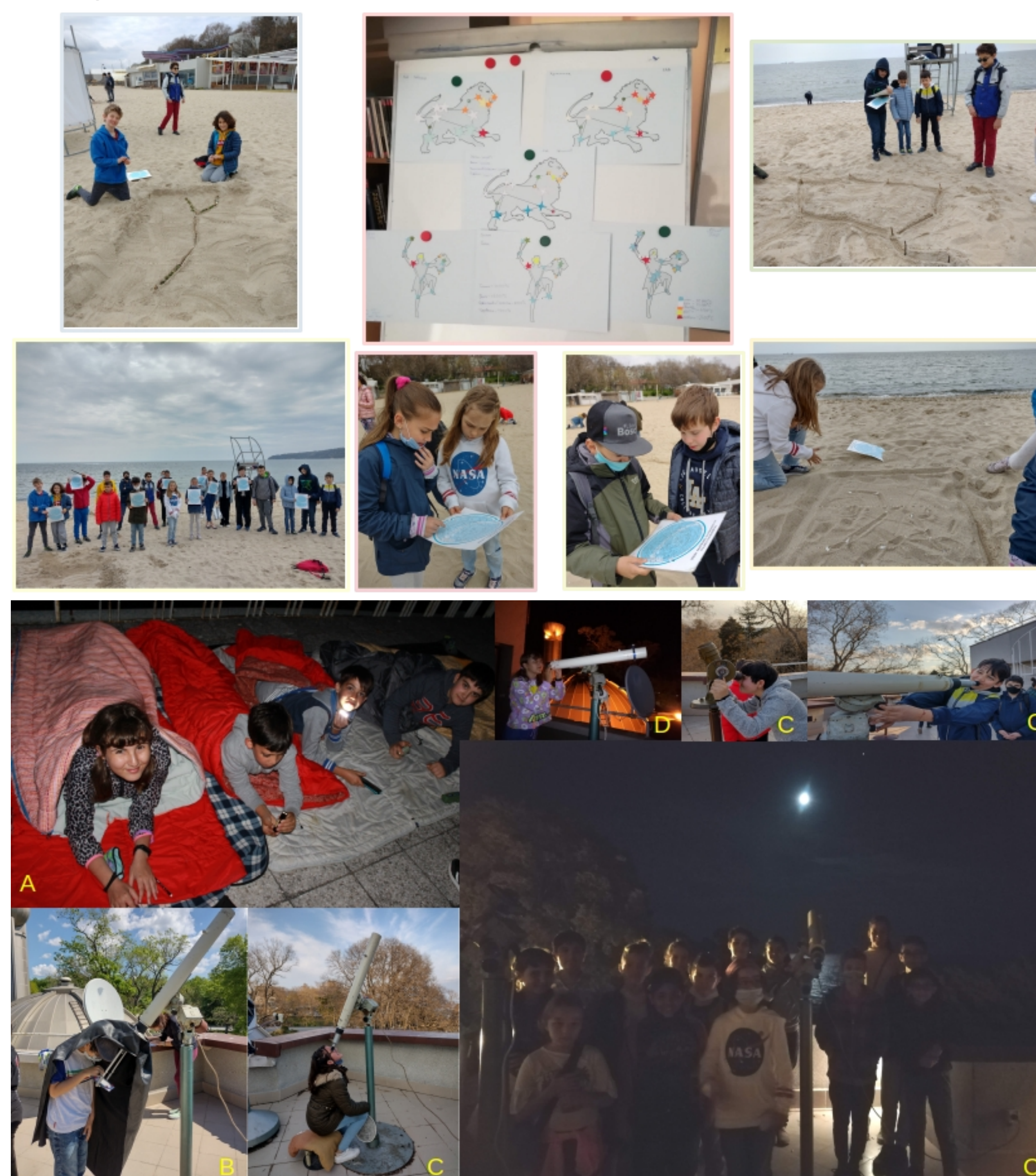


Figure 4. Activities at the beach.

Figure 5. Observations:
A- meteor showers;
B- Sunspots; C- Moon at different phases;
D- measuring the distance to the Moon.

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References: [1] Exploring Stars in the Milky Way Educator Guide, NASA, 2013; [2] Artist's impression of the Milky way, NASA/JPL-Caltech/ESO/R. Hurt; [3] A gorgeous panorama of the Milky Way, ESO/S. Brunier;