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# Let me EnterSTEM you!

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## Abstract

The basis of our research lies in introducing the various aspects of the academic disciplines combined under the abbreviation STEM and promoting the benefits they offer to the younger generations. With the assistance of many discussions, social initiatives and projects our group was able to considerably raise general awareness towards the scientific field and succeeded in doing so in a way that is entertaining and captivating to the youth. Here we show the many approaches we took in order to pique the interest towards STEM and towards the different abilities it helps to develop such as interpretation and usage of data, better observational and analytical skills and teamwork. It is vital that on a global scale, the new generations are well-informed on the aforementioned subject and are able to find a deeper understanding of it. We believe that OSOS can give us the opportunity to show these disciplines in an innovative and interesting way.

**Keywords:** STEM; science; technology; engineering; mathematics

## Introduction

The project aims to reach a large audience both locally and internationally and raise public awareness towards the wonders and secrets that STEM holds in its depths. With new scientific and technological advancements being presented to us on a daily basis, it is crucial that the young generations view science and other disciplines in the field as something fascinating and worth pursuing. The events and sub-projects included in the concept offer not only the practical skills necessary for working in a scientific environment but also intellectual stimuli which would prove to be highly beneficial.

When short-listing topics for discussions, students and other young enthusiasts are encouraged to offer insight on the choice and share what themes they would like to discuss. In this way, the activities that are later organized are more engaging and interesting in their eyes.

By focusing on STEM disciplines as a whole students are able to differentiate between them and establish which one they prefer which would consequently wake their curiosity on the subject. Having such a wide scope of topics, they are able to not only learn new things in a professional or scholarly environment but also in informal conversations about simple concept with family and friends. The project's learning objectives were initially raising awareness about the benefits of STEM and the long-term advantages it could bring to people. It was conducted by students of 16-18 years old and it involved about 100 students. During the project partnerships were made with CERN representatives, with Romtech -3C company and with Municipality officials.

## Methodology

### Concept

With the fast-paced changes that technological developments present to society, each person must develop skills necessary for working in the scientific field, not only connected to conventional practices but also to modern digitalized procedures. Among the people of our society, only few are accustomed to different advancements in our lifestyles and know how to efficiently use them. For this reason, it is important that by showcasing the different aspects and advantages of STEM societal views are changed and the general awareness is raised. In this way, people would be more informed, self-sufficient and would be able to freely gather the benefits of different scientific disciplines.

## Implementation

After determining the underlying problems it is vital that an adequate solution is found. Optimal results could be found by holding multiple discussions on the topic of how the modern society could be made 'smarter' and more open to science-related topics. As a part of the program the pupils' involvement in civil life in the community would be enhanced by the development of their projects which is centered around the organization of public discussions and lectures, connected to artificial intelligence and other revolutionary scientific discoveries. Benefits could also be received by taking part in innovative science competitions and other activities which could enable students to think outside of the box. In addition, a school science fair could be set in motion, so as to spark the interest towards STEM in the younger generations.

For the project we created a site, on which we were able to present various themes and document our work and activities, concerning STEM. We then turned our attention to 3D printing and its many aspects. Later on we used our newly-established skills in order to create authentic models of our own. We participated in the competition "A Beamline for Schools" which helped us to hone our practical skills and to gain experience in conducting experiments. The basic idea of the experiment was to check if the charged K-mesons behave as particles with odd or even parity under space reflection. If the K-mesons decay into two protons then they should be even, while if they decay into three pions they should be with odd parity. The simultaneous observation of the two processes would mean that the K-mesons behave like particles with both even and odd parity which would be impossible if the parity was a conserved symmetry. Namely the two pion and the three pion decays of the charged kaons, the so called  $\Theta$ - $\tau$  puzzle, have been the processes that had led to the idea of the parity violation.

We also organized several debates discussions and lectures on different topics such as "artificial intelligence" and "revolutionary scientific discoveries". AI systems are expected to impact society, especially the job market, and could increase inequalities. To counter the abuse of probabilistic prediction and the risks to privacy, in April 2016 the European Parliament and the Council of the EU adopted the General Data Protection Regulation. The European Parliament also requested an update of the Union legal framework on robotics and AI in February 2017. With the wish to offer assistance in this endeavour, our group decided upon raising awareness towards the characteristics of strong AI and development of super-computers via a debate. We divided ourselves into two groups which defended opposing viewpoints and as a result we not only learned more about the benefits of such technology but also were taught to practice caution towards the still unknown sides of AI. Finally we arranged a small science fair, where young science enthusiasts could share their ideas and views

## Conclusions

All results from the activities were presented to fellow students from different schools in the city in organized events. The public lecture about CERN was presented to the open public and covered by the local media. The practice was shared as well on a seminar for senior councils in Brussels. Our participation in the European Youth Parliament in November in Brussels allowed the participants to share their ideas and projects with other young people from whole Europe. The interest that the local authorities showed to these topics, helped the popularization in the local media outlets. Immense support was offered to us by our physics teacher Mrs. Pepa Pavlova and our English teacher Ani Pavlova without the help of which we wouldn't have been able to participate in this initiative. We were also offered assistance by Mr. Venelin Kozuharov, representative of the Faculty of Physics at the Sofia University; Mr. Aleksandar Hristov, who is a part of the Bulgarian team at CERN and Mr. Dimitar Varganov, who works at the Romtech-3C company. A special role in our participation in this project also has Professor Boika Aneva, who informed us about the initiative and helped us stay motivated along the way. Lastly, we would like to also acknowledge the help of the Bulgarian politician Mr. Vladimir Uruchev and of the many Municipality officials, who not only offered constant support but also helped in publicising our ideas. We would like to express our gratitude to them and to everyone who also helped us on our journey towards knowledge.

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