DE BRON VRIJE ASO SCHOOL	Date: xx November 2020	Classes: 6WEW6 / 6WEW8 5AL / 5BL	
	Teachers: Els Merveillie, Peter Helgesson	Marks:	100
Task reference	**Modern Physics – Research task**		
LICEO LUGO	**BACK TO THE FUTURE OF PHYSICS** *one small step towards the final frontiers*	eTwinning	

Deadline

Sunday 7th February 2020 at 19:00 pm (Belgian and Italian Students)

Topics and Teams

Group	Topic	Belgian Members	Italian Members
1	Photonics and spectral analysis	Xenia-Alexandra Cordonnier Eline Debaere Céline Oosterlinck	Carlotta Caravita Beatrice Dalle Vacche Alessia Federici
2	Nanotechnology	Joke Deschepper Eléa Ladrouz Auke Schelstraete	Federico Carta Martina Margotti Rachele Modeo
3	CERN and LHC	Caressa Haerts Amber Lambrecht Adrienne Leleu	Letizia Babini Laura Marangoni Alessia Ricci Bitti
4	Nuclear physics in medicine	Viktor Vandaele Tim De Backer	Alessia Ravagli Sophie Tabanelli
5	Gravitational waves	Lowie Vandaele Kilian Truyaert Lennart Vandenbroecke	Silvia Bongiovanni Alessandro Costa Mila Cristoferi
6	Black holes	Pieter Verhelst Tibo Vanmarcke Bruno Vervelghe	Anna Cernera Chiara Dovadola Lucia Margotti
7	Antimatter	Tessa Moyaert Sara Deschepper Anna Wojcik	Chiara Converti Veronica Savini Matilde Totti
8	The Standard Model	Victor De Jaeghere Thomas Deprez Bernd De Wintere	Viola Goni Francesco Marri
9	Nuclear physics in medicine	Léonie Breyne Maité Deschepper Jinte Vandenbroucke	Martina Berto Sara Coatti Carlotta Neri
10	Antimatter	Phebe Verbrugghe Fjolla Ujkani Romy	Anna Cortesi Beatrice Orsini Giorgia Tabanelli
11	Black holes	Vincenzo Vantornout Stijn Ver Eecke Robbe Van Ryckeghem	Matteo Invidia Alessandro Geminiani Filippo Magnani
12	CERN and LHC	Henri Bolliou Tobie Defoer Lauren Dewulf	Chiara Ghirardini Chiara Passariello
13	The Standard Model	Louise Wostyn Emma Cortier Irina Van Holm	Rufina Gaydarzhi Silvia Pallotti
14	Nanotechnology	Domien Lefranc Wout Willems Tristan Vanoverbeke	Giulio Bondoli Alfredo Bianchi Samuel Maenza

General Instructions

Each team should perform a research project on their assigned topic. The results of the findings should be summarised in a short report, and the reports of all teams will be gathered in an e-book. See also document "topics" for more information about the research on the topic.

Physics level of report

It is important that you write your report on an appropriate level for your readers. Not too difficult, but not too superficial either. Remember that your target group is your classmates.

Cut and Paste:

Avoid using "cut and paste". Study carefully your source, think about what it says, discuss with your teammates until you understand the physics explained in the source, and rewrite with your own words using your own understanding. A golden rule is to never write anything that you have not understood yourself.

Proofreading

Even if you divide your research task and write separate parts, you are all responsible for the entire document. Each one of you is required to proofread the entire document to assure that all parts of the work is of the same quality. When you proofread you should check for language errors, physical errors and check the physics level. If you don't understand everything, it is probable that neither your classmates do; so, discuss within the team how to improve and make it more understandable.

Sources and references:

- Internet (universities, CERN, NASA, etc; it is required to use several sources other than Wikipedia).
- Textbooks.
- Scientific journals and articles.
- TV programs.
- Youtube.
- Interviews (if someone knows a physicist working in the field of the selected topic, you can gather information by making an interview of that person).

Use only sources that are on an appropriate level for yourself. Elaborating the information in the source, you should be able to understand (almost) everything.

Bibliography:

At the end of the report you should include a bibliography, that should be detailed. If you use internet sources, you should give the full link and if the web page is long, you should also give the title of the paragraph you are using. If you use books or scientific articles you should give the name of the book/journal/article, editor, printing year and the pages used. In case you use interviews to gather information, you should write "Interview" in the bibliography, name of the interviewed person, their professional title, and the date of the interview.

About Figures:

Many figures can be found on the internet; however, you **cannot** use figures that are copyright protected. Make sure that you are allowed to copy and use the figures you take from the internet. Many university sites (and similar) allow that you use their figures but require that you state the origin of the figure.

In your report you should make a list in the bibliography, stating the origin of all the figures in the report (name of the source and a direct link).

Note that you can also produce your own figures, either by a hand drawing and scan, or by a computer drawing. In this case in the figure list in the bibliography you write “Drawing” and your own name.

First page:

The report should begin with a title stating the assigned topic, the names of all the authors and the name of the schools.

Length of the report:

Minimum: 9000 characters. Maximum 12 000 characters (excluding the bibliography).

Font and dimension:

Times New Roman, 12 pt, single line spacing

Number of figures:

Minimum: 6 figures. Maximum 12 figures.

File format and naming of submitted file:

- Word document (.docx) .
- naming: Team_xx-‘topic’.docx, example: Team_07-Antimatter.docx

Evaluation and feedback - Rubrics

	OUTSTANDING	OKAY	COULD BE BETTER	NEEDS IMPROVEMENT
Physical correctness	The report contains only a few minor, or none, errors in the presented physics.	There are some errors in the physical presentation.	There are too many errors in the presented physics.	The physical presentation is full of errors.
	12 - 15	**9 - 11**	**1 - 8**	**0**
Physics level	All sections and paragraphs are on an appropriate level.	The main part of the report is on an appropriate level and only a few paragraphs are on a too difficult or simple level.	Some sections and paragraphs are on an appropriate level, while others are on a too difficult/simple level.	The entire report is on a too difficult/simple level.
	8 - 10	**6 - 7**	**1 - 5**	**0**
Captivating	The report is both original and captivating.	The report is interesting and appealing.	The report is uninspiring and rather boring.	The report is dull and really boring.
	8 - 10	**6 - 7**	**1 - 5**	**0**
Teamwork	All members have participated to the same extent (and proofread) to create a coherent report.	Only in a few paragraphs a different style can be sensed	Some sections are coherent, while others are an assembly of individual parts	The report is just an assembly of separate individual parts.
	8 - 10	**6 - 7**	**1 - 5**	**0**
Usage of "cut and paste"	The text is original and no direct copying of phrases from other sources can be found.	Most of the text is original and only a few paragraphs have been copied.	Several sections and paragraphs are directly copied from one or several sources.	The entire text is directly copied from one or several sources.
	12 - 15	**9 - 11**	**1 - 8**	**0**
Use of language and physical terms	The report is written in a proper English with a correct usage of physical terms.	The report is well written with only minor errors in English and/or in the usage of physical terms.	The report contains too many errors in English and/or in the usage of physical terms.	The report is full of English errors and/or an incorrect usage of physical terms.
	8 - 10	**6 - 7**	**1 - 5**	**0**
Figures	The figures are relevant, informative and gives a good contribution to the understanding of the text.	Most of the figures are relevant, informative and gives a good contribution to the understanding of the text.	The figures are relevant, but are mainly decorative and contains very little information	The figures are not pertinent and do not contribute to the understanding
	12 - 15	**9 - 11**	**1 - 8**	**0**
Bibliography	The bibliography is complete and detailed.	The bibliography is to a large extent complete and detailed.	Only a few items in the bibliography are written with sufficient detail.	The bibliography is lacking, or the items are lacking sufficient detail.
	12 - 15	**9 - 11**	**1 - 8**	**0**