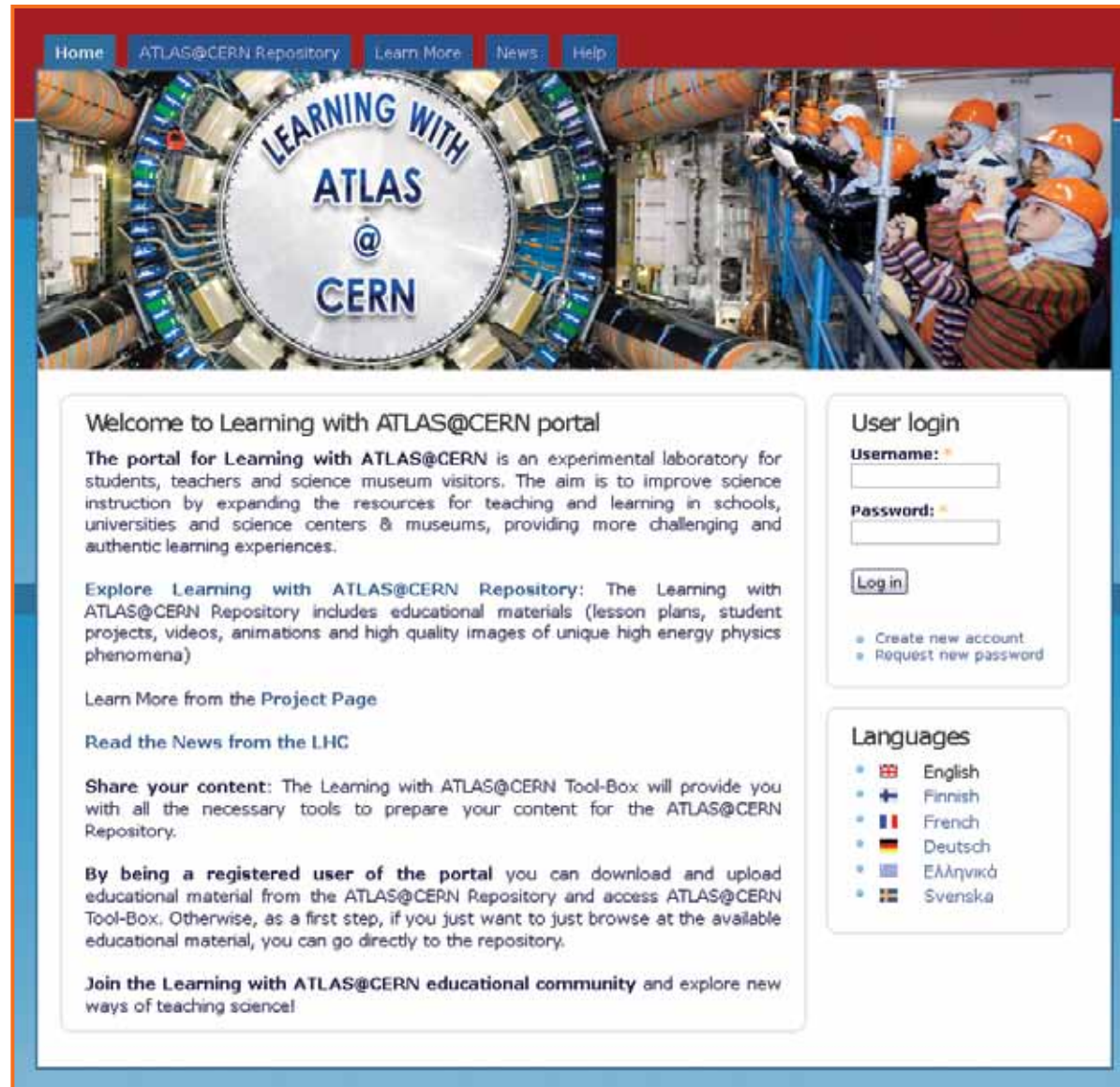


# Learning with ATLAS@CERN



## Summary:

The portal for Learning with ATLAS@CERN is a e-science application designed for use by students, teachers and even science museum visitors. The aim is to improve science instruction by expanding the resources for teaching and learning in schools, universities and science centers & museums,

providing more challenging and authentic learning experiences and lessons.

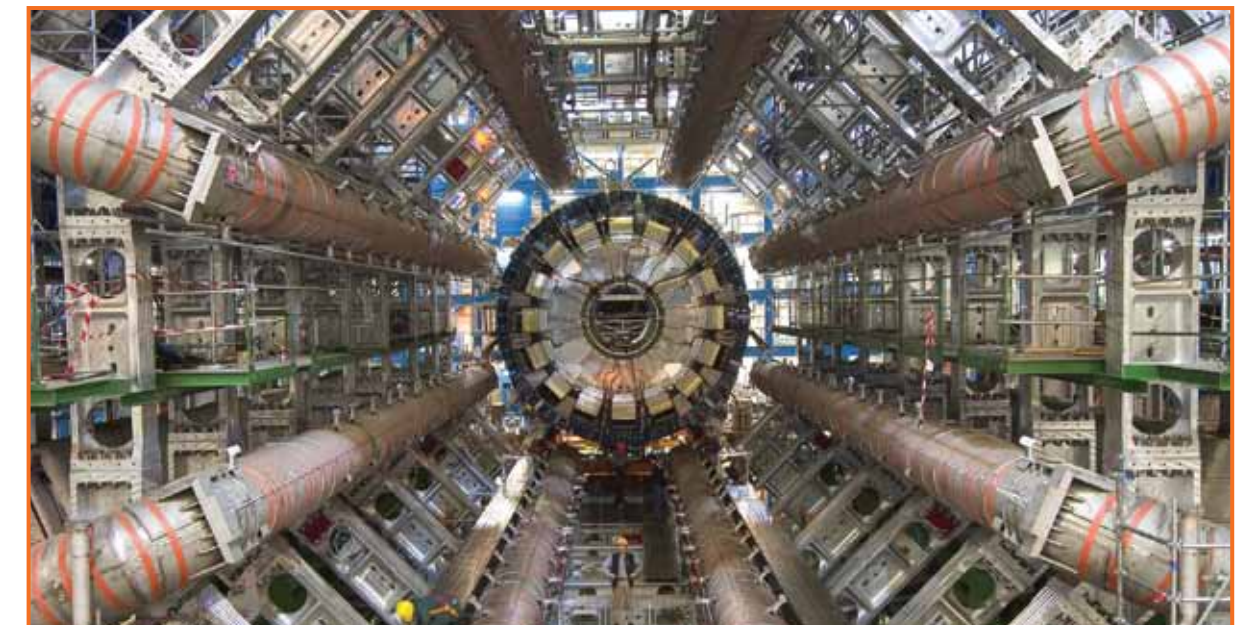
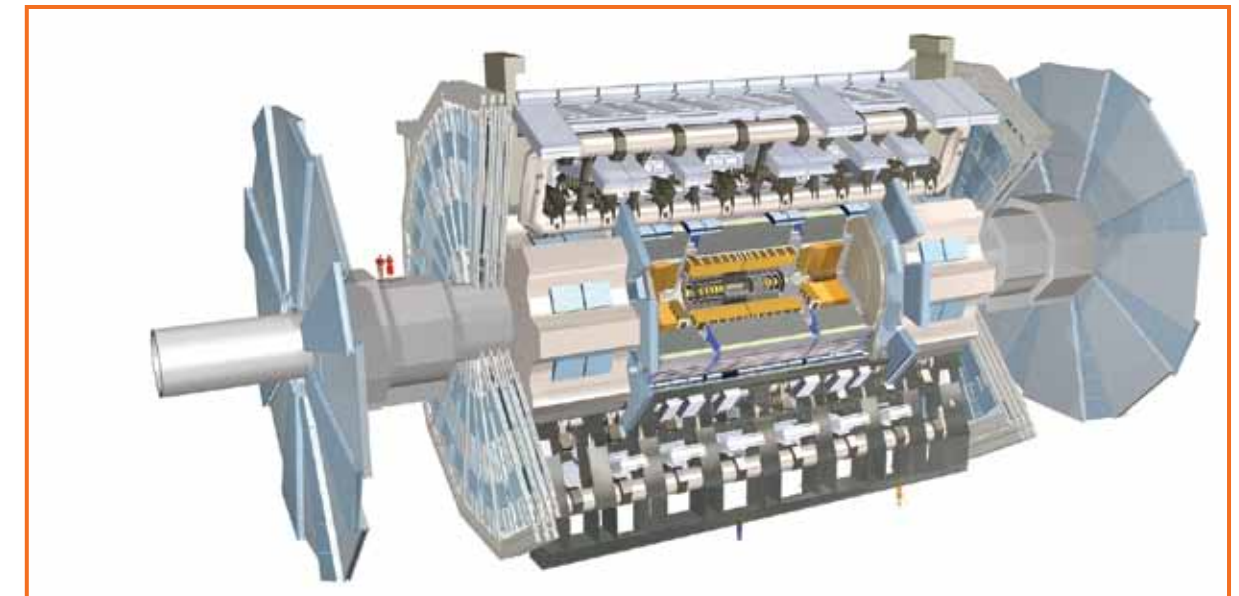
## Aims:

The LA@CERN portal aggregates scenarios and objects that are uploaded by school teachers, university professors, researchers, or any other

member of the public. Its aim is to act as a repository where a school teacher can find complete scenarios of simple educational objects that fit the needs of his classroom.

## Main activities:

The user of the portal can search for the desired material and tools based on a comprehensive classification system. In addition the material are provided in various different languages.





# Learning with ATLAS@CERN

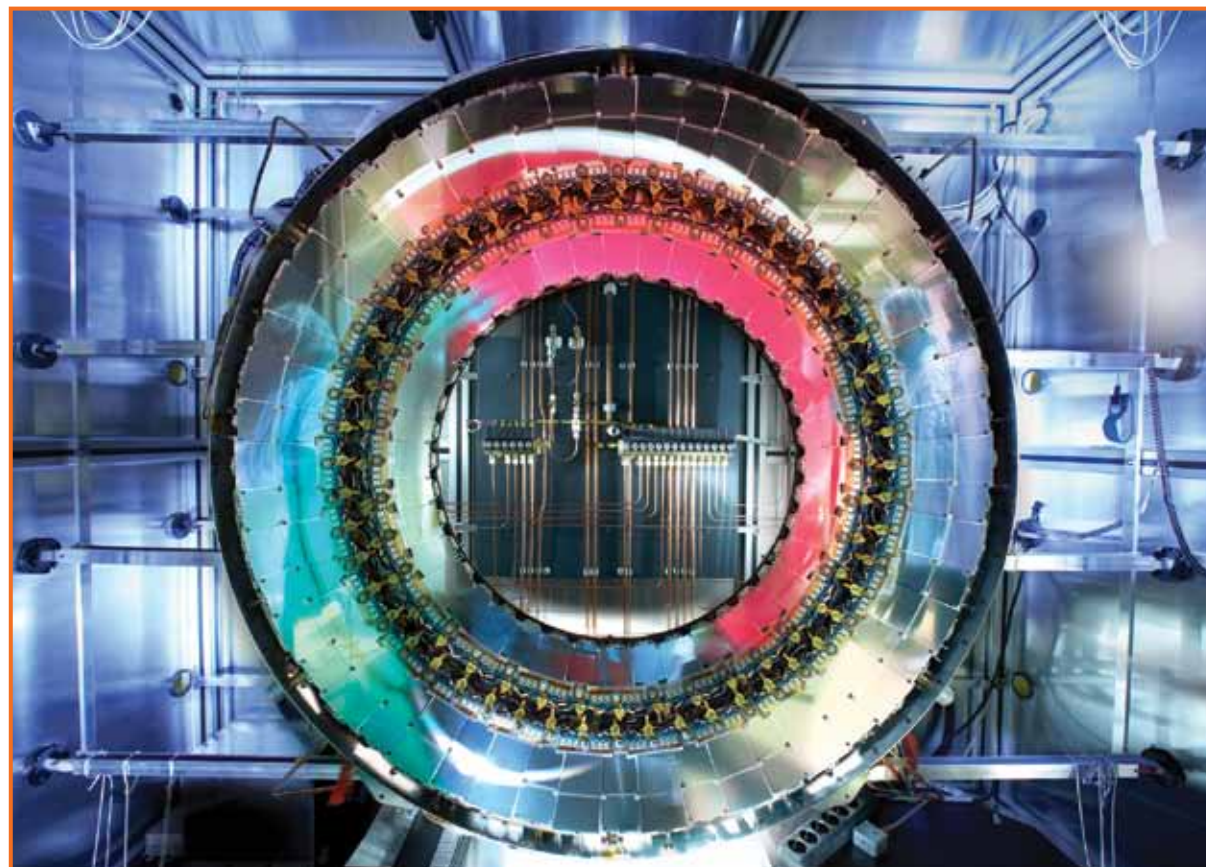
## Narrative:

The portal for Learning with ATLAS@CERN is an experimental laboratory for students, teachers and science museum visitors. The aim is to improve science instruction by expanding the resources for teaching and learning in schools, universities and science centers & museums, providing more challenging and authentic learning experiences. The Learning with ATLAS@CERN Repository includes educational materials (lesson plans, student projects, videos, animations and high quality images of unique high energy physics phenomena). In the ATLAS@CERN Repository one can search for Educational Content and Learning Missions. By using the provided user interfaces you can find the material you are looking

for. You can also browse through the top rated material in each category. The Learning with ATLAS@CERN Tool-Box will provide you with all the necessary tools to prepare your content for the ATLAS@CERN Repository. It contains links to three interactive event analysis tools (AMELIA, HYPATIA & MINERVA) that allow users to explore the events collected by the ATLAS experiment at CERN in an intuitive way, which is much friendlier than the public through 3D and 2D animations of physical processes in a game like approach. The web pages of the three analysis tools include detailed information on the use of the tools and support materials for teachers and students. Learning with ATLAS@CERN is trying to build

a community of users interested not only in downloading educational material, but also in developing novel material through use or re-use of existing works. To facilitate this need the ATLAS@CERN Portal offers a user friendly web based interface for uploading material. In order to upload

new Educational Content or Learning Missions it must be first tagged with metadata according to the IEEE LOM standard. This is done by employing the ATLAS-LOM Metadata Authoring Tool. Full access to all the tools uploads and downloading material is given only to registered users.



<b>End user:</b> End users of the portal are usually school students of the upper two levels who learn from the new material presented by the teachers in their class. However it can also provide material for visitors of science centers or students of universities.	<b>Location:</b> School, university, museums	<b>Evaluation parameters:</b> With questionnaires/interviews distributed by the WP of the LLP EU project and continuous use of Google analytics.
<b>Involved actors:</b> Teachers of the last two grades, university professors, educators in general.	<b>Languages available:</b> Material is available in English, Greek, Finnish, French, German and Swedish.	<b>Connection with the curriculum:</b> The connection with the school curriculum varies depending on the specific material downloaded from the portal by the involved actor.
	<b>Where to find the application or case:</b> <a href="http://www.learningwithatlas-portal.eu/">www.learningwithatlas-portal.eu/</a>	
	<b>Duration:</b> The duration depends on the material selected.	

Teachers' Competencies		
1	subject matter/content knowledge	x
2	nature of science	x
3	Multidisciplinary	
4	knowledge of contemporary science	x
5	variety of (especially student-centred) instructional strategies	x
6	lifelong learning	
7	self-reflection	x
8	teaching/ learning processes within the domain	
9	using laboratories, experiments, projects	x
10	common sense knowledge and learning difficulties	
11	use of ICTs	x
12	knowledge, planning and use of curricular materials	x
13	Information and Communication Technologies with Technological Pedagogical Content Knowledge	

# Mapping best practices with main principles



## 1. Building interest in natural science phenomena and explanations:

The Learning with ATLAS@CERN brings the use of 'cutting-edge' eScience applications to school students. These applications promote science teaching and learning as a process of inquiry as well as technological thinking as a process of problem solving. They act as the window onto live scientific experiments and phenomena, ongoing scientific research, and the personalities and stories of working scientists across Europe.

## 2. Building up informed citizens: Students understanding the nature of Science & Science in society:

Using The Learning with ATLAS@CERN resources is a powerful illustration of how an eScience experience can provide rich and meaningful opportunities for people to participate in and learn about science. With the appropriate guidance from the research teams, students can use tools of science as they learned the practices, goals, and habits of mind of the culture of science.

## 3. Develop multiple goals:

- understanding big ideas in science including ideas of science, and ideas about science
- scientific capabilities concerned with gathering and using evidence
- scientific attitudes

By engaging in scientific activities, students also develop greater facility with the language of scientists; terms like hypothesis, experiment, and control begin to appear naturally in their discussion of what they are learning. In these ways, students begin to gain entry into the culture of the scientific community and start to change the way they think about themselves and their relationship to science. When a transformation such as this one takes place, young people may begin to think seriously about a career in a research laboratory.

## 4. Understanding students' concepts and learning style about of science phenomena:

The Learning with ATLAS@CERN learning environment allows students to work through material at their own pace, with different levels of support according to their own preferences. Inevitably, different students will embrace technology to greater or lesser extents and in different ways through the complementary interfaces the system offers.

## 5. Relevance of the content to daily life of students:

Today much of the ethical and political decision-making involves some understanding of the nature of science, its strengths and limits. To understand the role of science in deliberations about the projected outcomes of the experiments taking place in the LHC, their safety and value -given the immense investment involved- all students, need to be critical consumers of scientific knowledge. The proposed practice improves students and teachers ability to engage in such debates, since they not only impart a knowledge of the content, but also a knowledge of 'how science works', "an element which should be an essential component of any school science curriculum".

## 6. Understanding science as a process not as stable facts. Using up-to-date information of science and education:

The proposed practice introduces students to concepts and ideas of science of a multidisciplinary nature spanning all science disciplines and engineering. As such it safeguards sustained intellectual engagement by the majority of students, by asking them to employ real-problem solving skills, to handle and study situations, and to engage in meaningful and motivating science inquiry activities.

## 7. Activities for gaining knowledge, not for entertainment, nor for simple imitating of results:

The students will be asked to employ real-problem solving skills. Adopting this approach, the dynamic character of scientific thought will be efficiently assimilated, stimulating and encouraging the creative minds of the participating teenagers. By engaging in scientific activities, students also develop greater facility with the language of scientists (e.g. hypothesis, experiment, and control). In these ways, students begin to gain entry into the culture of the scientific community and start to change the way they think about themselves and their relationship to science.

## 8. Doing science: experimenting, analyzing, interpreting, redefining explanations:

The activities that are supported by the portal are expected to trigger students' scientific adventure and incorporate the 'wow' factor (i.e. wonder) in the learning of science. The use of the portal explicitly develops such science related occupational aspirations, by demystifying the work of the researcher, making it familiar and tangible for younger students. On the other hand, the use of such eScience applications in school will also help to authenticate curriculum work, as students can see first-hand the relevance and application of the science learnt in the classroom, in the real world.

## 9. Assessment: formative ~ of students' learning and the summative ~ of their progress:

The evaluation design and the analysis of the results from the use of the portal were made by the research team of the University of Bayreuth and it is presented in the Guide of Good Parctice of the project. The results demonstrate the efficiency of the scenarios that are available through the portal to promote the introduction of IBSE in the school environment. Furthermore the data demonstrate a significant change on teachers behavior toward a "teacher as a designer of the educational activities" that is one of the most crucial characteristics of an IB approach in science education.

## 10. Cooperation among teachers and with experts:

The use of the Learning with ATLAS@CERN portal expands opportunities for teachers' professional development, including occasions to interact with working scientists, e-masterclasses, science contests, workshops and training seminars. The teachers who will participate in the project will become curriculum developers themselves, validating thus the proposed approach and methods. According to the National Science Education Standards (NRC, 1996) "the challenge of professional development for teachers of science is to create optimal collaborative learning situations in which the best sources of expertise are linked with the experiences and current needs of the teachers".