



THE  
**ATLAS**  
EXPERIMENT  
OUTREACH COMMITTEE

M. Barnett and E. Johansson, Co-coordinators



**OUTREACH COMMITTEE**

**The advent of LHC has placed a new urgency in our efforts.**

**The public and teachers are beginning to turn their attention our way.**

**The newsmedia are showing growing interest in ATLAS (National Geographic Magazine, NOVA, Physics World, ...).**

**When datataking begins, the interest will peak, and the demands on us are likely to be substantial.**



## OUTREACH COMMITTEE

**The collaboration is responding to this challenge in a number of ways.**

**ATLAS management has begun consultation with experts.  
Formulating ATLAS Communication Plan.**

**E&O is part of this global strategy. The official budget for the E&O group has been growing as have the contributions of many ATLAS institutions.**

**The number of collaboration members joining these efforts has grown, and their time and effort is increasing.**

**Ongoing consultation with:**

- CERN Public Affairs Office**
- Other LHC experiments**
- European Particle Physics Outreach Group**

# ATLAS Education and Outreach

Tuesday 3 October 2006 18:15-19:45

0. Tour of the cavern (17:00)
1. Globe, visits itineraries for 2007, and open day for 2008. Bernard Pellequer
2. ??Report on CERN public affairs activities C. Sutton
3. "Spinoff" brochure
4. Event Analysis for student activities C. Kourkoumelis
5. Event Analysis for student activities (AMELIA) M. Barnett
6. Press Packet M. Barnett
7. Communications received by the Secretariat C. Potter
8. ATLAS External Communications Plan M Nordberg
9. ATLAS Souvenir Book C. Marcelloni
10. U.S. Outreach program for the ATLAS M. Barnett
11. Report on QuarkNet K. Cecire/ K. Whelan
12. The ATLAS Puzzle & Faces of ATLAS poster P. Gagnon
13. Producing a Physics brochure
14. Enhancing public website
15. Best photos and images
16. Creating video clips for news media
- ?? The latest work on the animation of ATLAS (10')
- ?? Exhibition in SX1 (06-10')
- ?? CERN-guided tours at ATLAS (06-10')

M. Barnett and E. Johansson – July 2006

## **Projects recently completed or under development:**

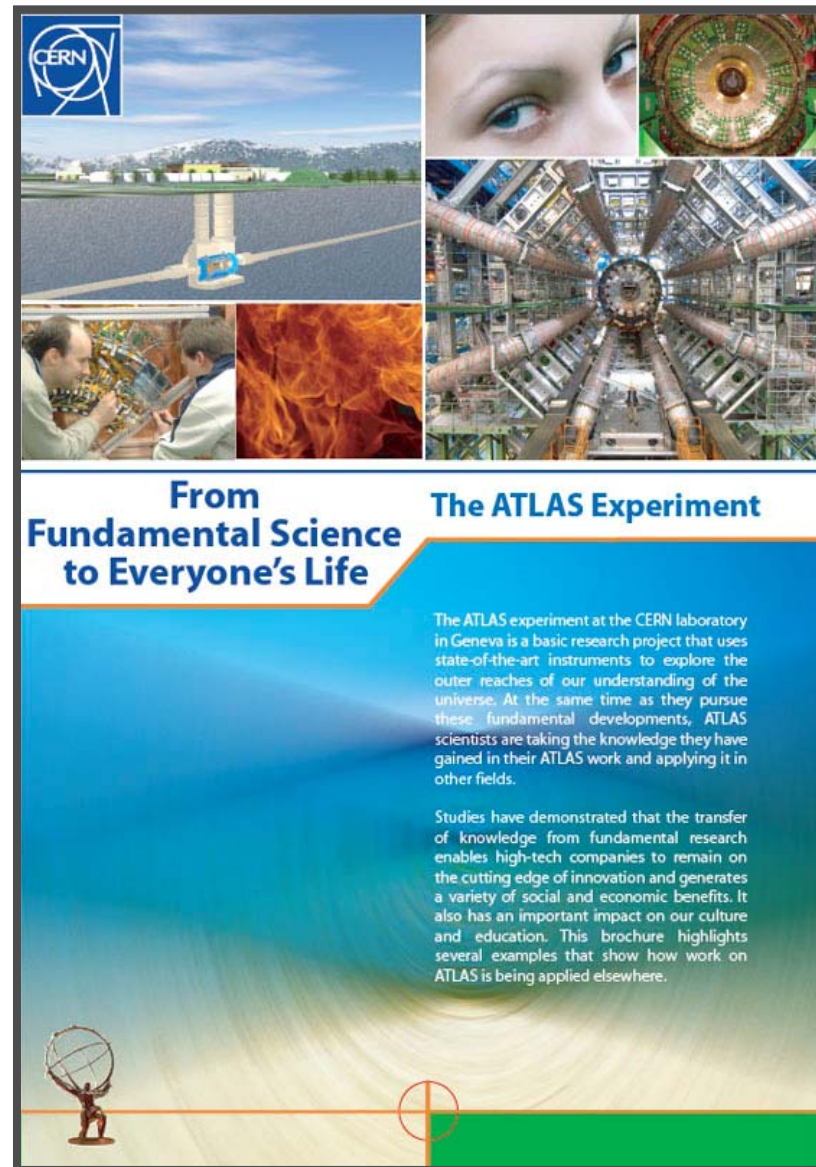
- **Animated Video clips**
- **Real-life Video clips**
- **Web listing of stories in the newsmedia about ATLAS**
- **Latest ATLAS news headlines**
- **Animated features (Episodes I and II on a DVD with the ATLAS Movie)**
- **Press Kit**
- **Webpages for the newsmedia**
- **Best photos and images of ATLAS webpages**
- **Brochure (and webpage) on applications of work on ATLAS**
- **Brochure (and webpage) on the physics of ATLAS**
- **ATLAS facts/numbers sheets and webpage**
- **ATLAS exhibit in Bldg. SX1**
- **Special events such as Open Day**
- **Programs of high school student event analysis**
- **Masterclasses for high school students**
- **Andrew Millington movie**

## **ATLAS products include:**

- **3D viewer of detector**
- **Puzzle with 500 pieces**
- **T-shirts**
- **Posters**
- **DVDs**
- **Brochures**
- **Press Kit**



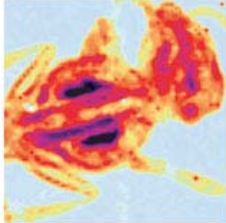

# ATLAS Technology Transfer Brochure

Elisabeth Lahr-Nilles  
working with M. Kobel



M. Barnett and E. Johansson – July 2006

# Technology Transfer Brochure Sample Page

		<h2 style="text-align: center;">Medical</h2> <p>New, miniature electronic silicon chips have been designed for the ATLAS experiment to track elementary particles close to the collision point of the incoming proton beams. These small pixel semiconductor detectors are characterized by high detection efficiency and low noise, making them ideally suited for X-ray imaging in radiography, protein crystallography and material science. They can detect individual X-ray photons with high spatial precision over a broad energy range with extremely short readout times.</p>	
<h1 style="font-size: 4em; opacity: 0.5; text-align: center;">Medical</h1>			
<p><i>Pixel Matrix with 18 x 160 pixel cells. For comparison a part of a match is shown.</i></p> 		 <p style="text-align: center;"><small>3D mouse skeleton from the PIXSCAN</small></p>	
<h3>Multi Picture Element Counters</h3> <p>The innermost layers of the ATLAS experiment will be composed of silicon pixel detectors. Close to 100 million individually amplified detector cells are able to determine and trace the exact position of the charged particles produced in a proton-proton collision. The same type of pixel detector can be used for biomedical imaging when a high spatial resolution is needed, for instance in mammography. The detector simply counts the absorbed X-ray quanta individually, via tiny counters implemented in every pixel. <i>The method gives a truly digital image of the absorbed X-ray dose. The radiograph is visible in real time, eliminating the use of a film. Hence, a relatively small modification of the ATLAS pixel detector has led to digital radiography.</i></p>		<h3>Computer Tomography</h3> <p>PIXSCAN is a new method for Computer Tomography (CT). It uses the XPAD, a photon counting detector based on the ATLAS pixel chip. <i>PIXSCAN improves the contrast for soft tissues and produces up to 400 images in two seconds.</i> A first prototype has been developed for the examination of small animals. Given the small size of the animal, an extremely high spatial resolution is required. First tomographic images prove the quality of the new techniques. The extremely thin detector can also be used in combination with Positron Emission Tomography (PET). While PET gives the position of the tumour tissue only, the CT image shows the whole organ.</p>	
 <p style="text-align: center;"><small>Digital radiograph of a hornet</small></p>		 <p style="text-align: center;"><small>Section of 512-electrode array</small></p>	
		<h3>Retina Project</h3> <p>Together with neurobiologists, ATLAS physicists have studied the information that is transmitted from the eye to the brain. The retina is a sophisticated biological pixel detector that converts a visual image into electrical signals, called "spikes". These spikes act as a neural code and communicate the features of an image to the visual centre of the brain. To crack this code, live retinal tissue is examined and a recording system for large-scale neural activity has been developed based on the silicon microstrip detector technology used in the ATLAS experiment. <i>These experiments help neurobiologists to understand how living neural systems process and encode information and could one day give artificial sight for the blind.</i></p>	



# Technology Transfer Web version

**The ATLAS Experiment**

From Fundamental Science to Everyone's Life

**HOME**  
ATLAS Collab.  
For Press  
For Students  
For Physicists  
Science Centres  
Tour of ATLAS Detector Desc.  
Webcams  
Images  
Movie  
Multimedia  
Powerpoint  
ATLAS eNews  
Glossary  
Educ. Comm.  
Contact Us

**Medical**

The ATLAS experiment at the CERN laboratory in Geneva is a basic research project that uses state-of-the-art instruments to explore the outer reaches of our understanding of the universe. At the same time as they pursue these fundamental developments, ATLAS scientists are taking the knowledge they have gained in their ATLAS work and applying it in other fields.

**Technical**

Studies have demonstrated that the transfer of knowledge from fundamental research enables high-tech companies to remain on the cutting edge of innovation and generates a variety of social and economic benefits. It also has an important impact on our culture and education. This site highlights several examples that show how work on ATLAS is being applied elsewhere.

**Culture**

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## Technology Transfer -- Sample page




# The ATLAS Experiment

From Fundamental Science to Everyone's Life

<a href="#">Medical</a>	<a href="#">Technical</a>	<a href="#">Culture</a>
<a href="#">Medical</a>		<a href="#">Return Home</a>
<a href="#">Multi Picture Element Counters</a>	<a href="#">Computer Tomography</a>	<a href="#">Retina Project</a>

**HOME**  
[ATLAS Collab.](#)  
[For Press](#)  
[For Students](#)  
[For Physicists](#)  
[Science Centres](#)  
[Tour of ATLAS Detector Desc.](#)  
[Webcams](#)  
[Images](#)  
[Movie](#)  
[Multimedia](#)  
[Powerpoint](#)  
[ATLAS eNews](#)  
[Glossary](#)  
[Educ. Comm.](#)  
[Contact Us](#)



*Section of 512-electrode array.*



*Salamander retina on 512-electrode array.*

Together with neurobiologists, ATLAS physicists have studied the information that is transmitted from the eye to the brain. The retina is a sophisticated biological pixel detector that converts a visual image into electrical signals, called "spikes". These spikes act as a neural code and communicate the features of an image to the visual centre of the brain. To crack this code, live retinal tissue is examined and a recording system for large-scale neural activity has been developed based on the silicon microstrip detector technology used in the ATLAS experiment. *These experiments help neurobiologists to understand how living neural systems process and encode information and could one day give artificial sight for the blind.*

**Retina Project Credits:**  
**Alan Litke**  
Santa Cruz Institute for Particle Physics (SCIPP)  
University Of California Santa Cruz

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# ATLAS Public Homepage

Audiences  
News  
Webcams  
Products  
Physics  
Detector



The ATLAS Experiment

**HOME**  
ATLAS Collab.  
For Press  
For Students  
For Physicists  
Science Centres  
Tour of ATLAS  
Detector Desc.  
Webcams  
Images  
Movie  
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Powerpoint  
ATLAS Store  
ATLAS eNews  
Glossary  
Educ. Comm.  
Contact Us

**Latest News**  
Latest News  
The installation and connection of the final services to the inside of the detector (magnets, calorimeters, ID, cryogenics,...) has been started.  
More News...  
All the latest news  
Photo of the month

**Webcams**  
See ATLAS webcams!  
[Image of ATLAS detector]

**eTour**  
Click a subject below for an eTour!  
Introduction  
Physics  
Experiment  
Accelerator

**About ATLAS**  
ATLAS is a particle physics experiment that will explore the fundamental nature of matter and the basic forces that shape our universe. The ATLAS detector will search for new discoveries in the head on collisions of protons of extraordinarily high energy. ATLAS is one of the largest collaborative efforts ever attempted in the physical sciences. There are 1800 physicists (Including 400 students) participating from more than 150 universities and laboratories in 35 countries. More...  
Award-winning ATLAS movie  
How ATLAS collaborates

**The ATLAS Detector**  
Play the animation

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## Press Page

**The ATLAS Experiment**

**ATLAS for press**

**This page is under construction.**

**ATLAS Press Kit** ATLAS press kit coming soon. [Contact.](#)

**Photo of the month**

**Latest News** The latest ATLAS news.

**ATLAS in the news** ATLAS in the news.

**ATLAS Images** A collection of ATLAS photos

**ATLAS Video Clips** View and download ATLAS video clips.

**Technology Transfer** *From Fundamental Science to Everyone's Life.*

**ATLAS Facts** Coming soon...

**Physics of ATLAS** Coming soon...

**ATLAS detector** Coming soon...

**Tours of ATLAS** How to request a tour (visit) of the ATLAS buildings and cavern.

**How ATLAS collaborates** How the ATLAS collaboration works.

For further information please go [here](#).

For interviews please contact the [CERN Press Office](#).

*"Particle physics is the unbelievable in pursuit of the unimaginable. To pinpoint the smallest fragments of the universe you have to build the biggest machine in the world. To recreate the first millionths of a second of creation you have to focus energy on an awesome scale."*

*The Guardian*

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# Latest News

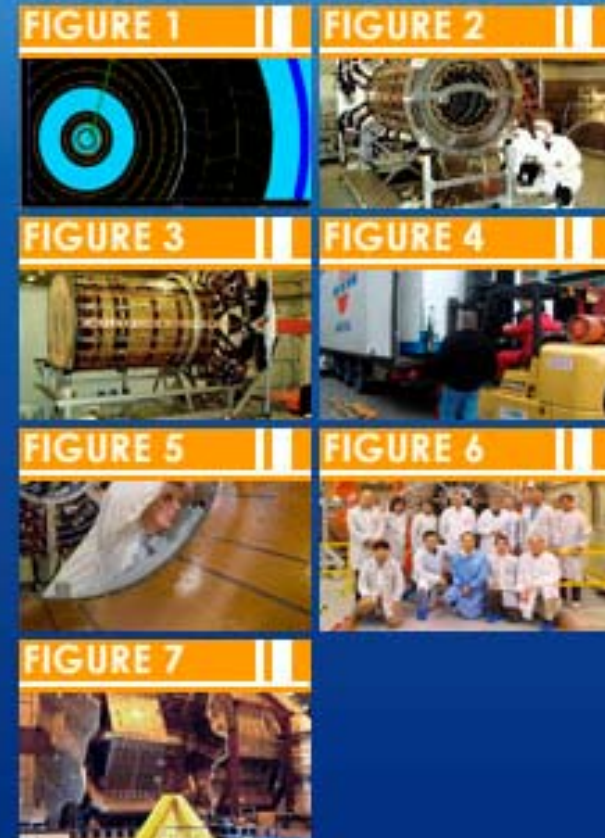
## Latest News (June 2006)

A major milestone for the Inner Detector project has been accomplished in early May as cosmic rays going through both the barrel Semiconductor Tracker (SCT) and Transition Radiation Tracker (TRT) have been successfully recorded in the SR1 building on the ATLAS experimental site at CERN. (Figure 1)

The first few months of 2006 saw the delivery to CERN of the final components of the ATLAS Semi-Conductor Tracker (SCT), namely the completed SCT end-caps. (Figures 2 thru 4) [More on this story...](#)

The SCT barrel was inserted in the TRT on 17 February, just missing Valentine's day. This was a change of emphasis for the two detectors. In the preceeding months there had been a lot of focus on testing their performance. The TRT had been observing cosmic rays through several sectors of the barrel. The two detectors had to be painstakingly aligned to be concentric to within a millimetre. (Figures 5 and 6) [More on this story...](#)

**End-cap Toroid Magnets:** In building 191 the first cold mass is, after many hurdles, now completely assembled. This means a new phase is started for the End-cap Toroid assembly: the

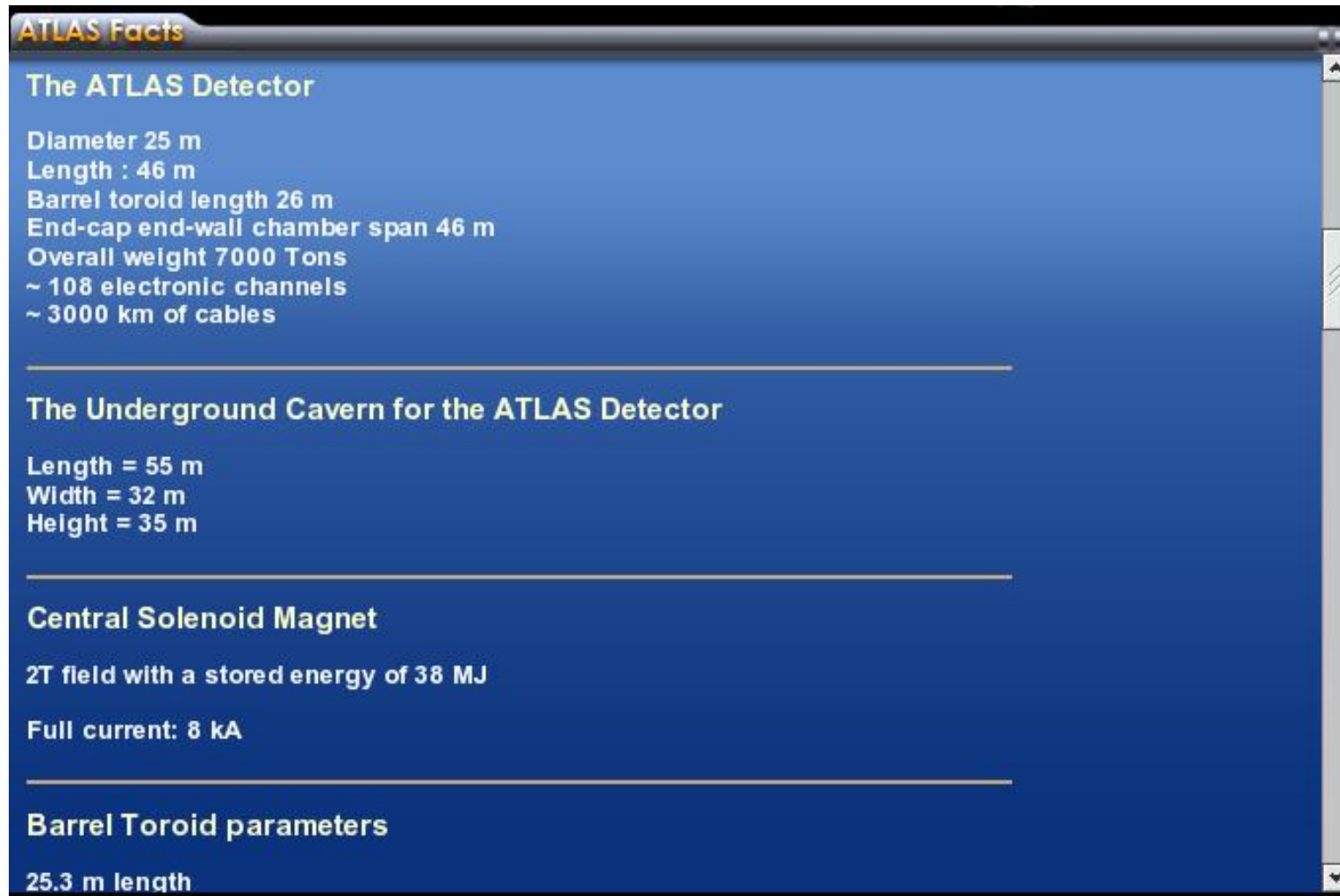


## ATLAS In the News

Please tell us of other news stories featuring ATLAS by emailing us [here](#).

The heart of ATLAS takes shape	CERN Courier
ATLAS at Last: Bringing Baby to CERN	The View
Energising the quest for 'big theory'	BBC News
Particle Physicists Play Hunt the Particle	New Scientist
The God Particle and the Grid	Wired
UK Boffins Sniff for Higgs Boson	The Register
Hole in the Ground To Probe Secrets of the Universe	Swiss Radio Intl.
Final Frontiers	Star Telegram
ATLAS Experiment	Wikipedia
ATLAS Experiment	Answers.com
Physicists Step Closer to Understanding Origin of the Universe	Physorg.com Science Daily
Large Hadron Collider Key Component Completed	Space Daily
The Quest for the Gold-Plated Collision	University of Michigan
Big Science, Big Opportunities	University of Melbourne
In search of a Unified Theory	University of Alberta
Heart of World's Biggest Physics Experiment Leaves Oxford	University of Oxford

# Draft ATLAS Facts Webpage



**ATLAS Facts**

## The ATLAS Detector

Diameter 25 m  
Length : 46 m  
Barrel toroid length 26 m  
End-cap end-wall chamber span 46 m  
Overall weight 7000 Tons  
~ 108 electronic channels  
~ 3000 km of cables

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## The Underground Cavern for the ATLAS Detector

Length = 55 m  
Width = 32 m  
Height = 35 m

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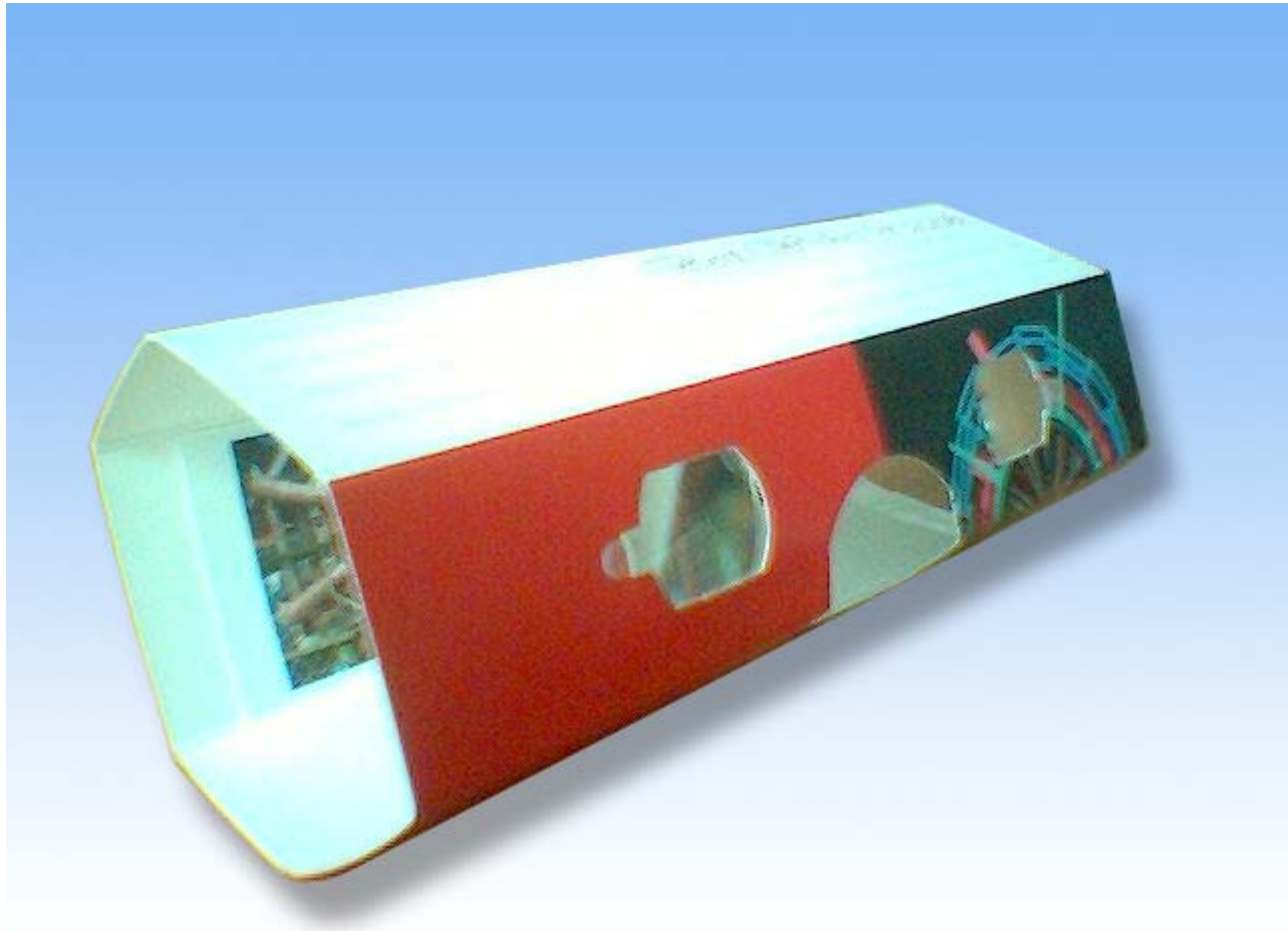
## Central Solenoid Magnet

2T field with a stored energy of 38 MJ  
Full current: 8 kA

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## Barrel Toroid parameters

25.3 m length



M. Barnett and E. Johansson – July 2006



# ATLAS Jigsaw Puzzle (P. Gagnon)



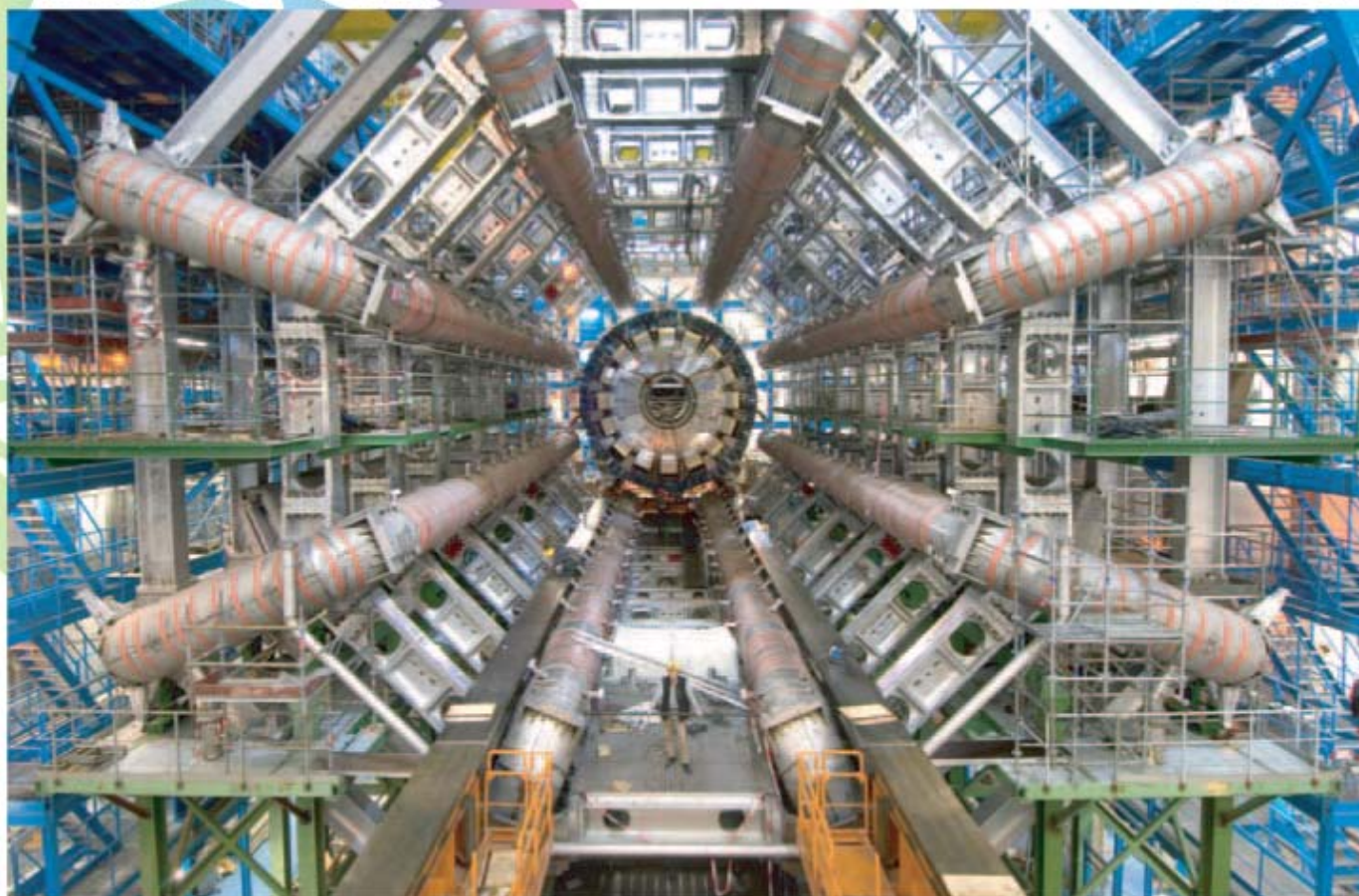
European Organization for Nuclear Research

The Atlas Experiment



<http://www.atlas.ch/>

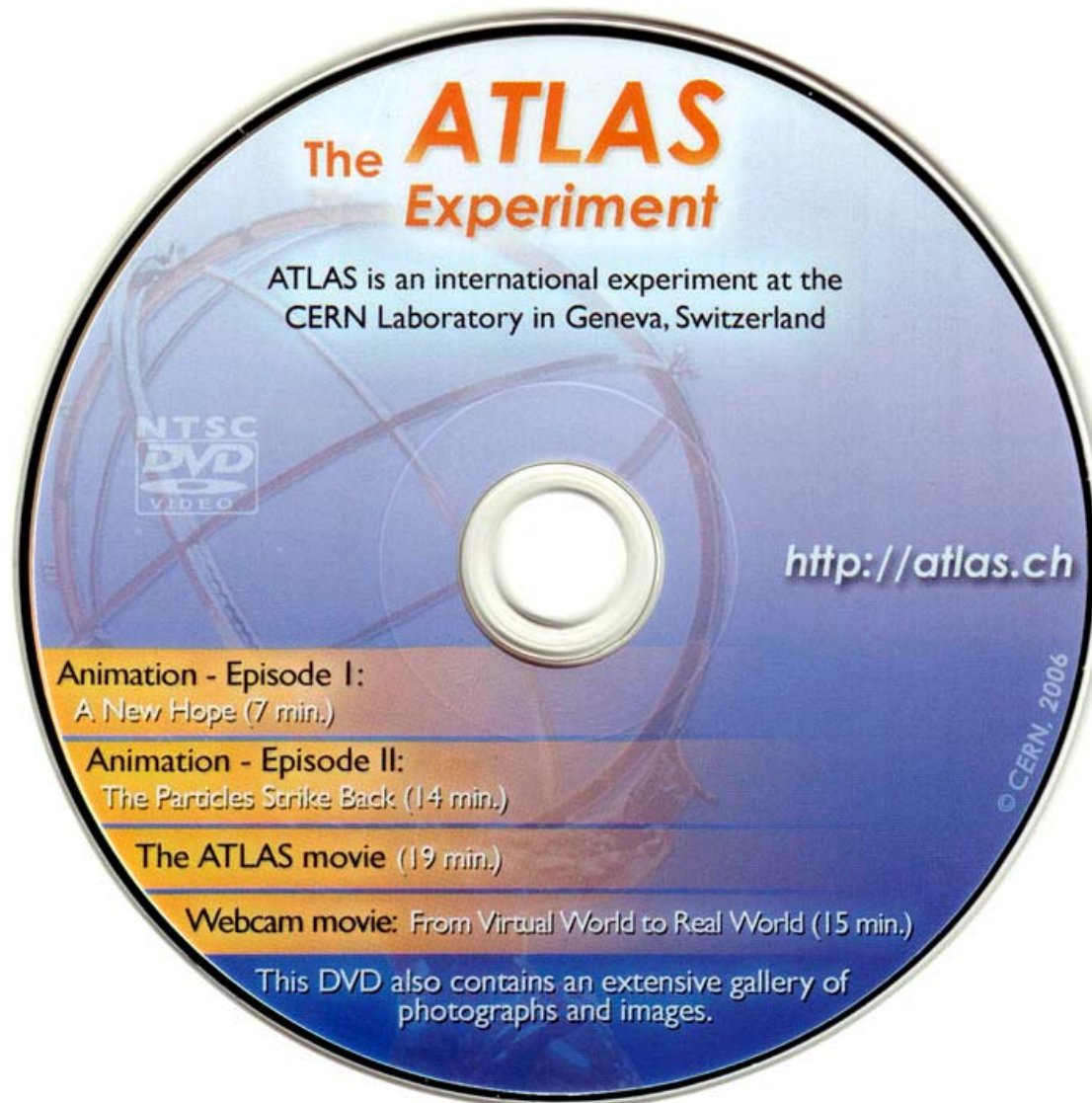
<http://public.web.cern.ch/public/>

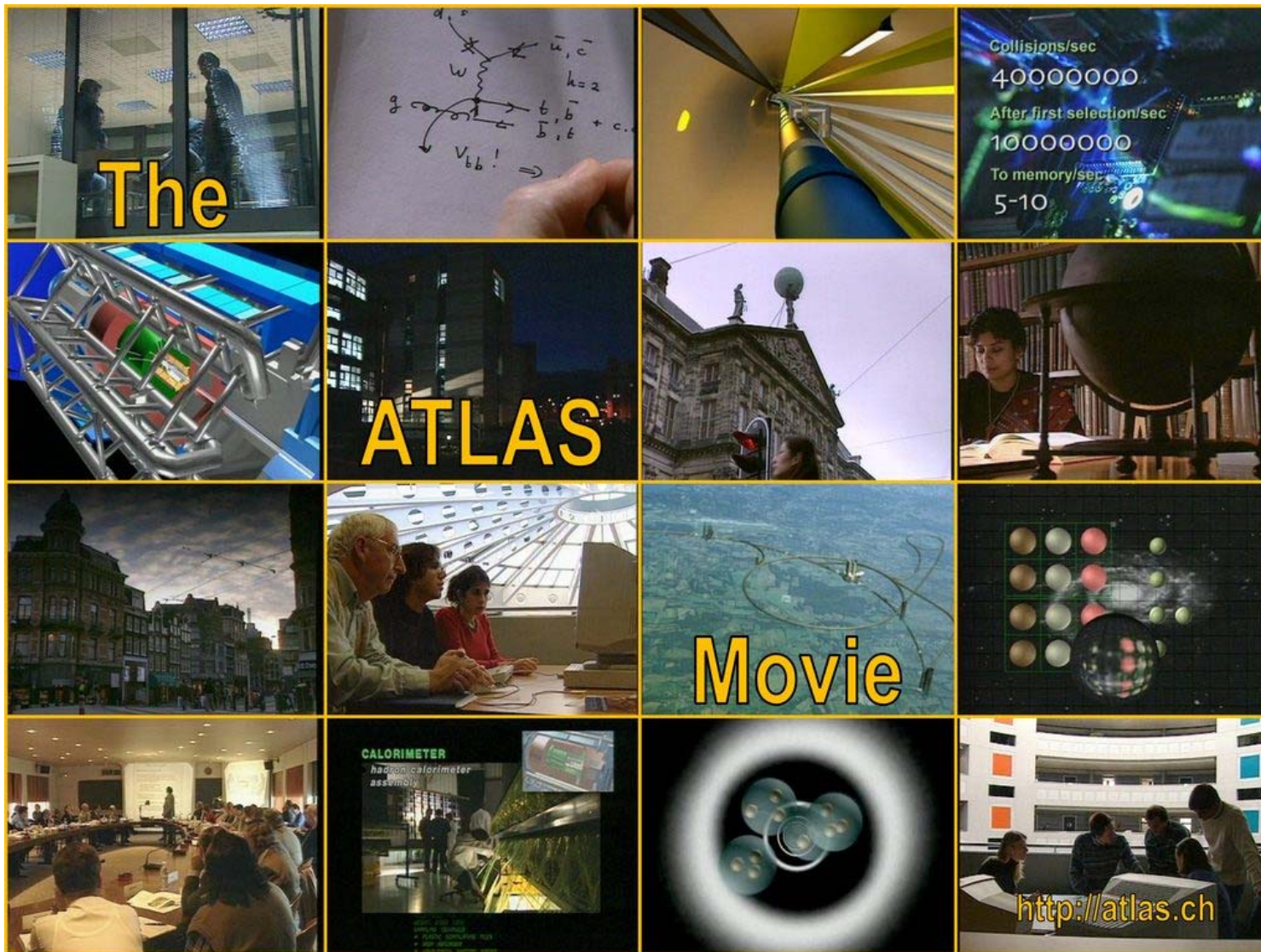


ATLAS is a particle physics experiment that will explore the fundamental nature of matter and the basic forces that shape our universe. The ATLAS detector will search for new discoveries in the head on collisions of protons of extraordinarily high energy. ATLAS is the largest collaborative effort ever attempted in the physical sciences. There are 1800 physicists (including 400 students) participating from more than 150 universities and laboratories in 34 countries. It is a challenge for us to put it together, we hope it will be a real puzzle for you too!

ATLAS est une expérience de physique des particules qui a pour but d'explorer la nature fondamentale de la matière et des forces qui gouvernent notre univers. Avec le détecteur ATLAS, nous espérons faire de nouvelles découvertes grâce à des collisions de plein fouet entre des protons lancés à d'incroyables hautes énergies. Cette expérience constitue le plus grand effort de collaboration jamais entrepris en sciences. Plus de 1800 physiciens et physiciennes (dont 400 étudiant-e-s) venus de quelques 150 universités et laboratoires de 34 pays différents participent à cet effort. C'est un défi de taille d'assembler un tel détecteur, nous espérons que ce sera un vrai casse-tête pour vous aussi!

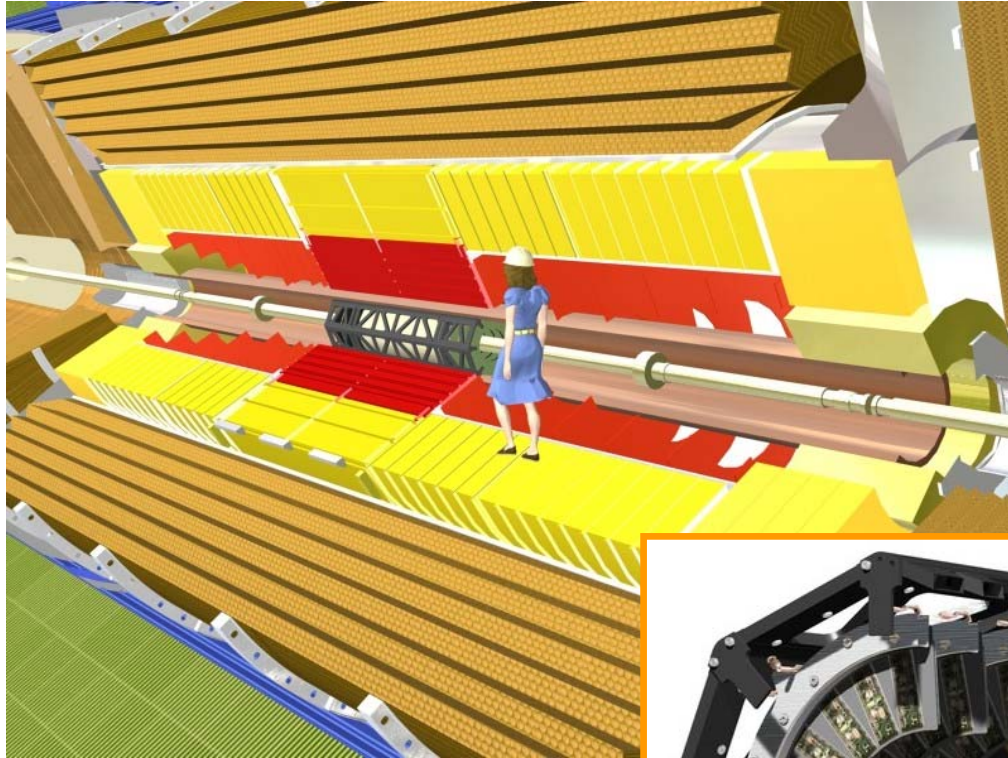
## DVD with Movie, Two Animations, Webcam movie, photos



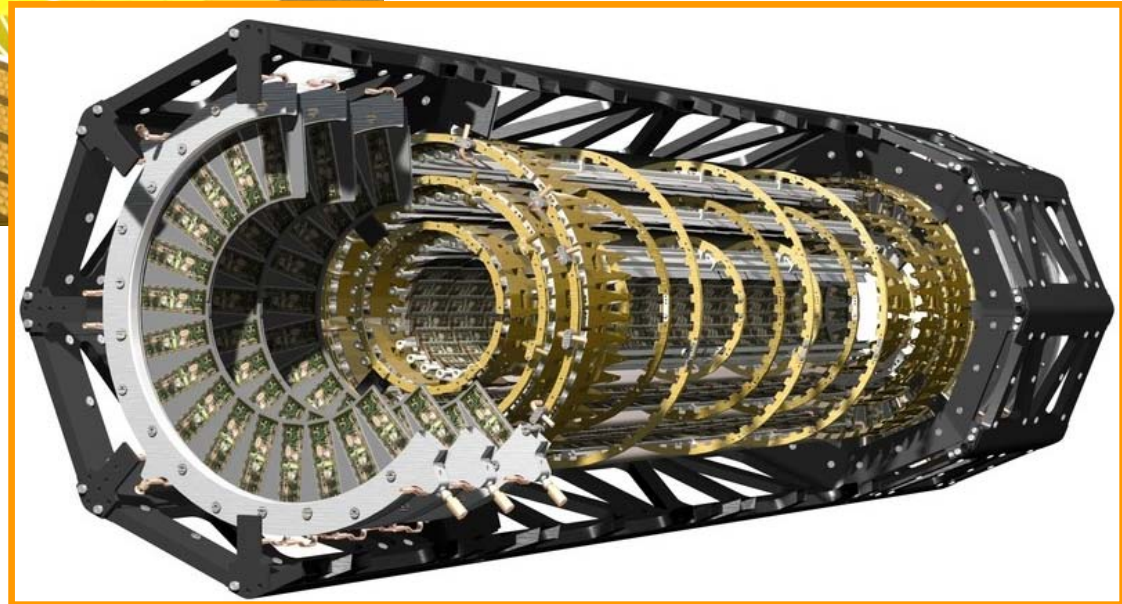


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# Animations



Episode 1

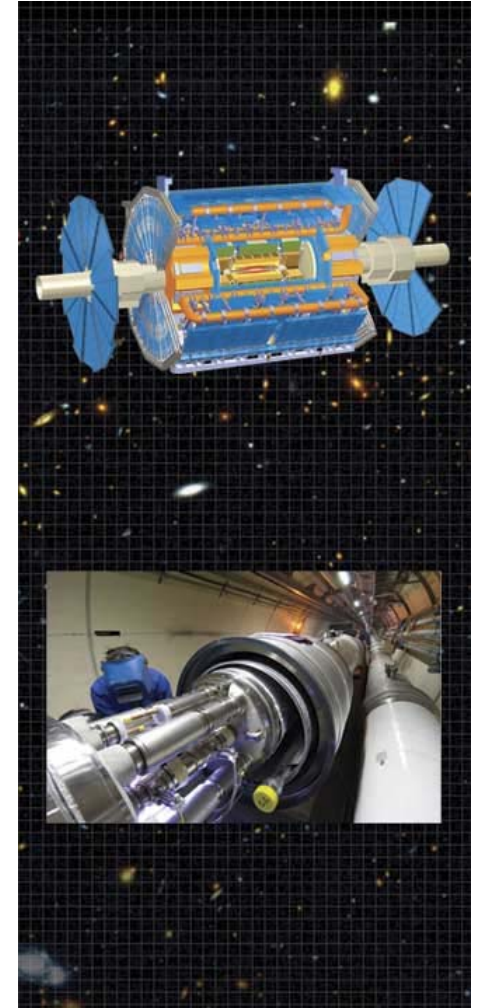


Episode 2

# The ATLAS Event Challenge

- An educational project using ATLAS particle collisions

**The ATLAS Student Event Challenge (ASEC) will make high school students part of the ATLAS Experiment by sharing actual ATLAS events with them and giving them the tools to analyze these collision events.**



# ATLAS Student Event Challenge

Intensive work underway at:

- **University of Athens (C. Kourkouvelis and students)**



ΕΘΝΙΚΟΝ & ΚΑΠΟΔΙΣΤΡΙΑΚΟΝ  
ΠΑΝΕΠΙΣΤΗΜΙΟΝ ΑΘΗΝΩΝ  
NATIONAL & KAPODISTRIAN  
UNIVERSITY OF ATHENS

Τμήμα Φυσικής  
Department of Physics

- **Lawrence Berkeley National Lab  
(Barnett, Pequeno, graphic artist, and two students)**



Berkeley Lab

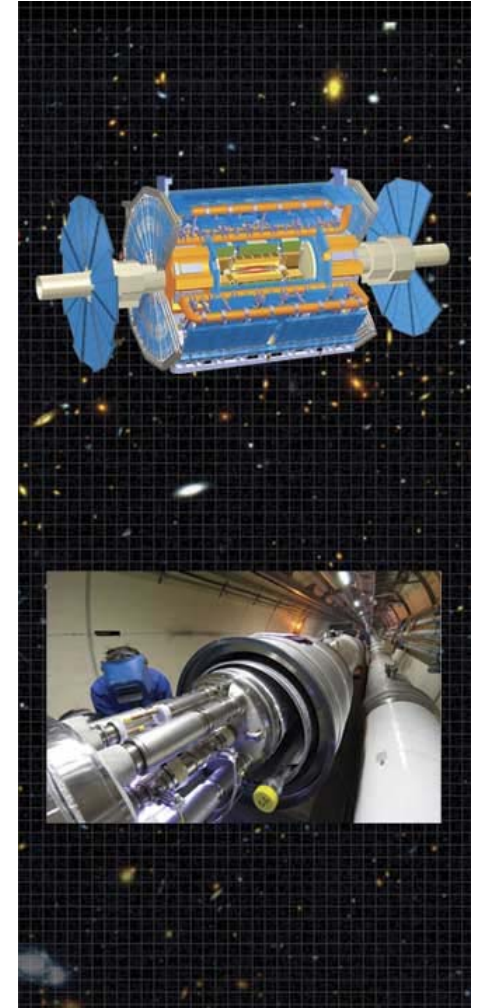
**An Athens demo (Kourkouvelis) and  
a Berkeley video clip will be shown later.**

# The ATLAS Event Challenge

- An educational project using ATLAS particle collisions

**The primary challenge of the program will be for student teams to examine actual and simulated events and to decode them to reveal the physics.**

**We expect that something like 500 to 1000 high school teams might participate (QuarkNet has over 500 high schools in the US).**



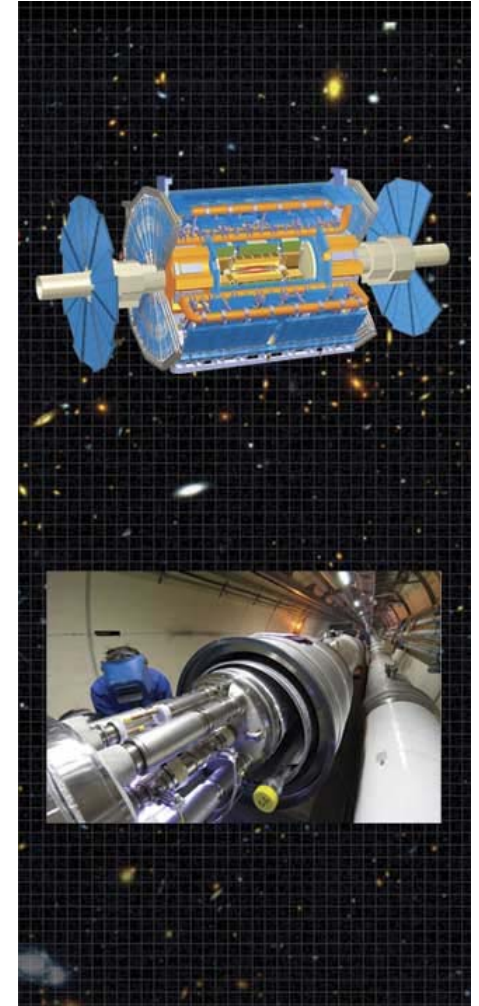
# The ATLAS Event Challenge

- An educational project using ATLAS particle collisions

## Learning with Events

The student activities might start with relatively simple physics subjects:

- Observation and reconstruction of Z
- Search for high mass Z' events
- Observation and reconstruction of top events





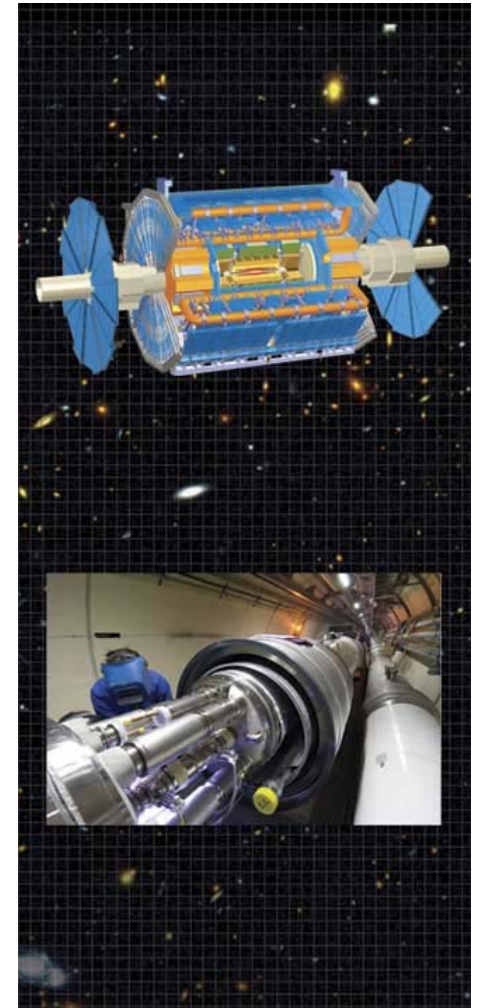
# The ATLAS Event Challenge

- An educational project using ATLAS particle collisions

## Learning with Events (2)

A simple example of possible research would be to study examples of simulated ATLAS events showing a variety of new physics events (supersymmetry, higgs, mini-black holes, etc.) along with Standard Model physics such as top quarks and Z bosons.

Students would be guided to learn the patterns of the events, so they can separate mini-black-hole events from top quark events from other classes of events. They would then apply what they learned to a larger sample of simulated and real events.



**A** **M** **E** **L** **A**  
**ATLAS**  
**M** **E** **L** **A**  
**Multimedia**  
**E** **Educational**  
**L** **Lab for**  
**I** **Interactive**  
**A** **Analysis**

## Video Clips -- Live and Animated

For newsmedia

For ATLAS talks and presentations

For websites

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Consider new ideas:

[YouTube.com](http://YouTube.com)

and

[MetaCafe.com](http://MetaCafe.com)

**You Tube**<sup>TM</sup>  
Broadcast Yourself

The entertainment community  
**Metacafe**

# YouTube.com

**You Tube**™ Broadcast Yourself [Sign Up](#) | [Log In](#) | [Viewing History](#)





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### Director Videos

 <p><a href="#">The Heart of Steel</a> 01:30 From: <a href="#">THEDIRECTOR</a></p>	 <p><a href="#">THE CONSUMERIST: Tekserve Ad with ipods</a> 00:14 From: <a href="#">consumerist</a></p>	 <p><a href="#">Hope Is Emo: Chapter One 'The Words Are Dying'</a> 03:24 From: <a href="#">digitalfilmmaker</a></p>	 <p><a href="#">88SLIDE: 'Cinco de Mayo' 5/5/06</a> 01:03 From: <a href="#">88slide</a></p>
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### Broadcast Yourself on YouTube

[Watch](#) Instantly find and watch millions of fast streaming videos.

[Upload](#) Quickly upload and tag videos in almost any video format.

[Share](#) Easily share your videos with family, friends, or co-workers.

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### Member Login

User Name:

Password:

[Sign Up](#)

Forgot: [Username](#) | [Password](#)

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### What's New at YouTube

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Sys Admins, Web Developers and Engineers and more within.


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**Enter NBC's [The Office](#)  
Make Your Own Promo Contest!**

### Featured Videos

[See More Videos](#)

	<p><a href="#">Explosion - An improvised synth solo</a> 07:51</p> <p>MooT BooXLe performing on the Synthesizers.com modular analogue synthesizer. This is not a perfect performance, as it was improvised in one go.</p> <p>Also functioning in this video are the Moogerfooger CP-251, the Roland Space Echo, and Reason drums.</p> <p>I was controlling the filter cutoff with a CV pedal.</p> <p>If you enjoy this video (or if you don't), please ... <a href="#">(more)</a></p> <p>Tags: <a href="#">moot</a> <a href="#">booxle</a> <a href="#">improvised</a> <a href="#">keyboard</a> <a href="#">bass</a> <a href="#">analog</a> <a href="#">synthesizer</a> <a href="#">synth</a> <a href="#">electronic</a> <a href="#">techno</a> <a href="#">synthesizers.com</a> <a href="#">solo</a> <a href="#">performance</a></p> <p>Added: 3 weeks ago in Category: <a href="#">Music</a></p> <p>From: <a href="#">mootbooxle</a></p> <p>Views: 57,458</p> <p>★★★★☆ 949 ratings</p>
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## **Video Clips** <http://atlas.ch/multimedia/>

### **Live**

**SCT-TRT Insertion**

**Toroid Lowering (camera on toroid)**

**Calorimeter centering in toroids**

### **Animated**

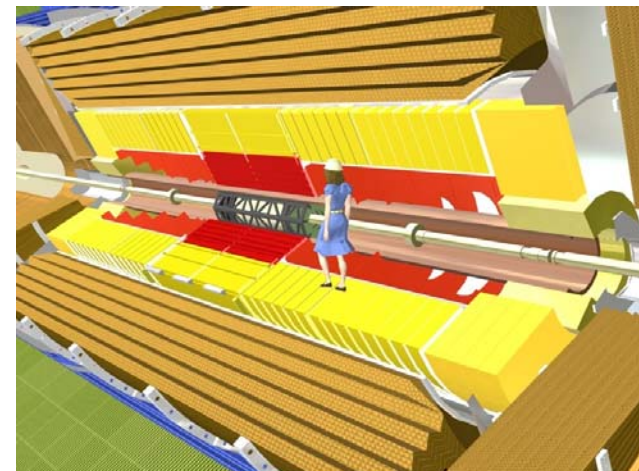
**LHC and Collision in ATLAS**

**Overview (extracted from Episode 1 animation)**

### **Clips from ATLAS Movie (3 clips)**

### **Seed magazine clip**

The U.S. National Science Foundation is investing significant funding to produce several 5-10 minute professional film clips to explain various LHC physics possibilities (Higgs, supersymmetry, etc.).



M. Barnett and E. Johansson – July 2006

# Best ATLAS Images Collection

Please  
send us  
other very  
good  
photos.

Home  
Press Page

## ATLAS Detector Photos

Photos shown are examples.  
Click on them to see additional photos.

Detector Site

Events

Muon Chambers

Toroid Magnets

Collaboration

LHC

Logos

Full Detector

Muon Detectors Tile Calorimeter Liquid Argon Calorimeter

Solenoid Magnet Pixel Detector SCT Tracker TRT Tracker

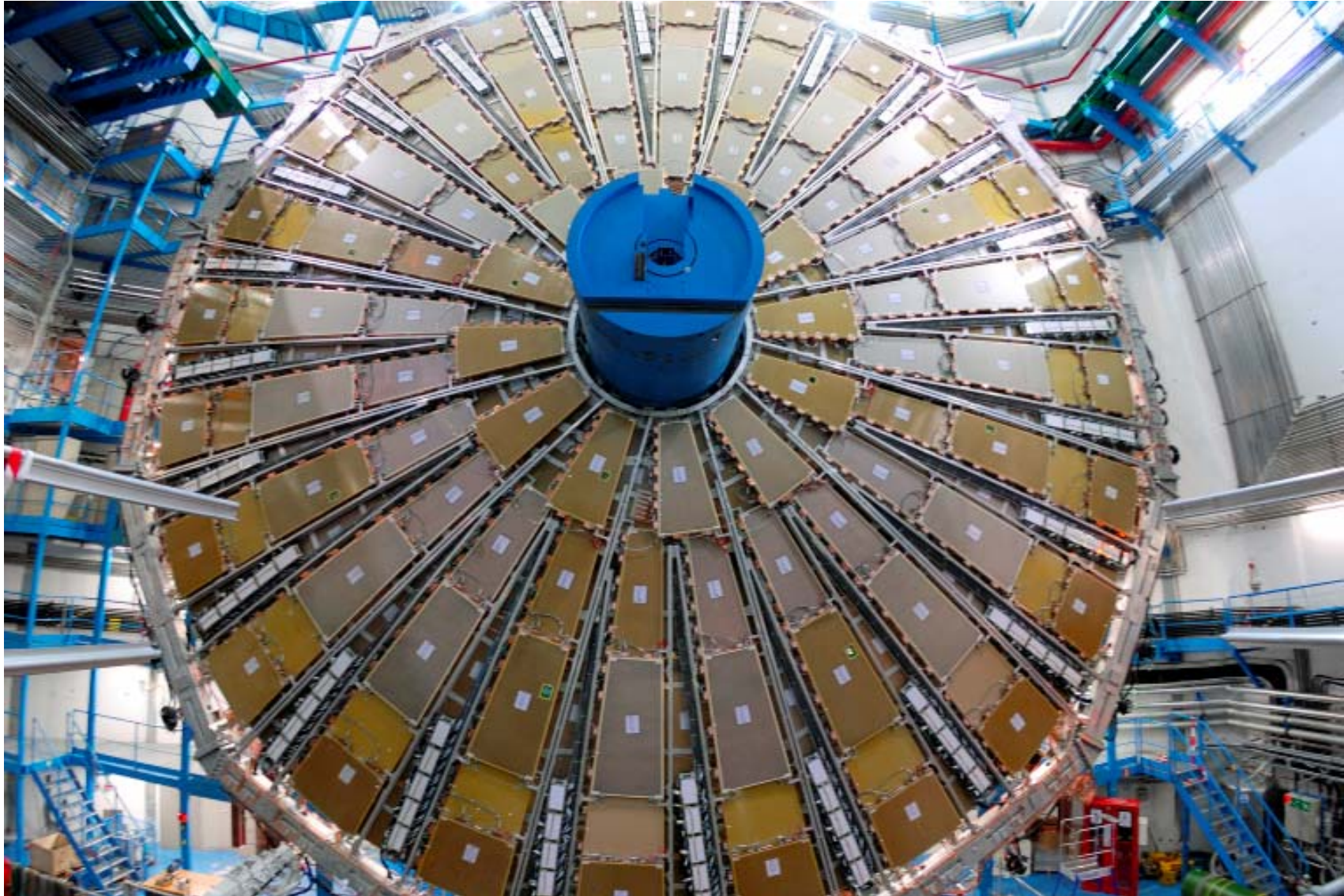
Inner Detector

Tile Calorimeter

Liquid Argon Calor.

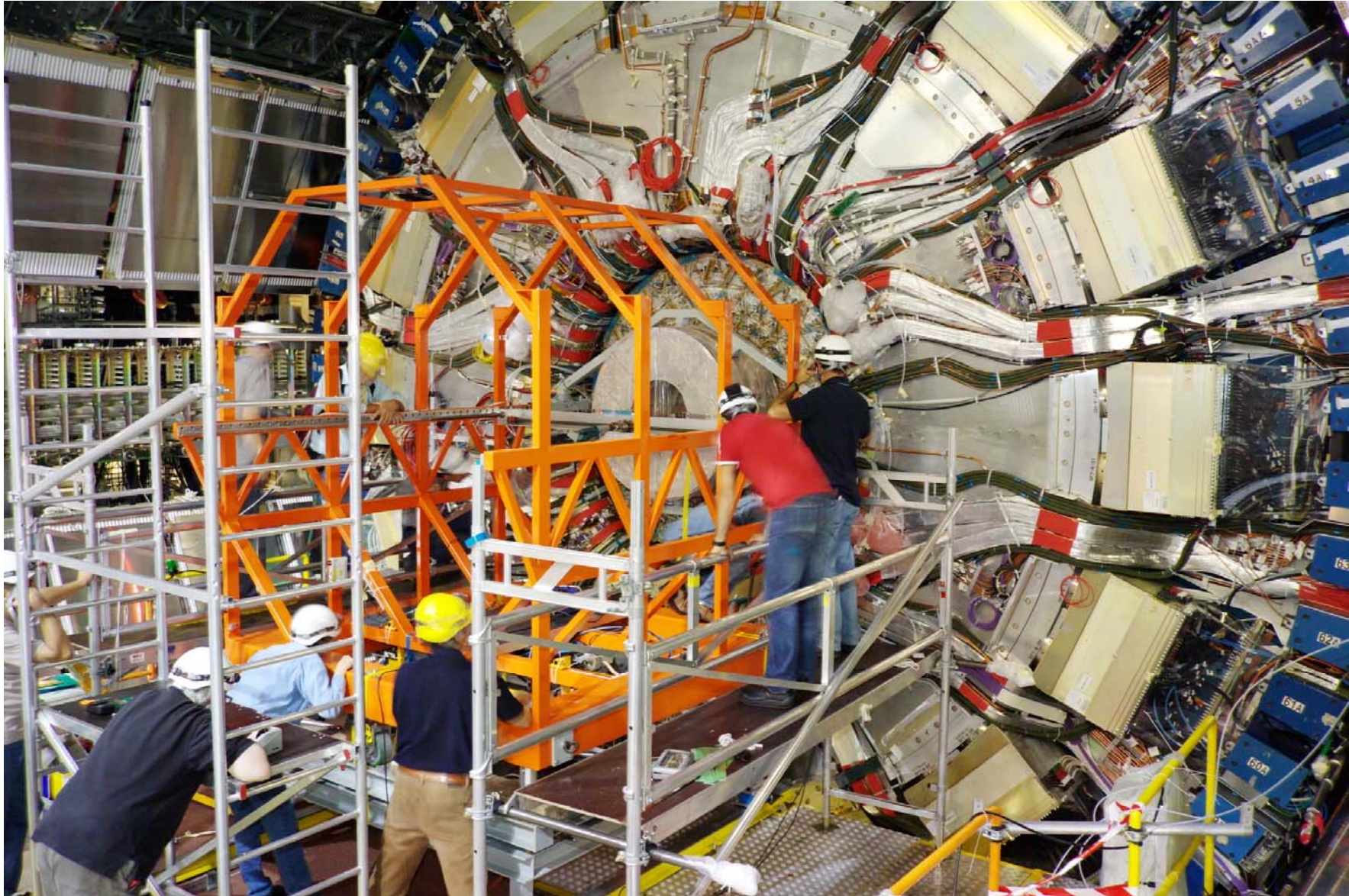
Solenoid Magnet

## Best ATLAS Images Collection



M. Barnett and E. Johansson – July 2006

## Best ATLAS Images Collection





## Best ATLAS Images Collection



M. Barnett and E. Johansson – July 2006

## Best ATLAS Images Collection



M. Barnett and E. Johansson – July 2006

## George Smoot – 2006 Nobel Prize in Physics with high school teachers



M. Barnett and E. Johansson – July 2006

# **A Proposal for the US on LHC Awareness**

**The advent of the LHC next year provides a golden opportunity to convey the excitement of physics, thereby raising the profile and enhancing the image of all of physics among the general public.**

**We plan to submit a proposal to DOE and NSF to support a number of outreach activities.**

**Preliminary ideas follow.**

# A Proposal for the US on LHC Awareness

- **The producers of NOVA are enthusiastic about creating an hour-long program on the LHC. We will help the producers at NOVA convey the science accurately, and guide them to the appropriate scientific experts.**
- **A web site that will be the public face of the US efforts at the LHC.**
- **A communications network among media and public information specialists at universities, national laboratories and other institutions to provide timely and coordinated reports to the popular media.**

Preliminary

# A Proposal for the US on LHC Awareness

- **Produce material that would explain the purpose and function of the LHC to the science policy community in Washington, and perhaps also to conduct briefings for members of this community.**  
**These activities would be strictly for informational purposes, bringing people who have invested in the LHC up to date as the machine turns on and begins to take data.**

Preliminary

# A Proposal for the US on LHC Awareness

Preliminary

**Some of these projects would also be coordinated with the American Association of Physics Teachers. For example:**

- **A booklet suitable for high school and middle school students, oriented around the “big questions” of the *Quantum Universe* report.**
- **We are working with Marge Bardeen on producing “Snackbooks”, sets of materials and instructions for table-top activities related to particle physics. We would recruit QuarkNet teachers to help develop these activities for high schools.**
- **Versions of above suitable for science museums and university physics departments would be developed in consultation with museum staff and university physicists.**

# A Proposal for the US on LHC Awareness

- **A library of short videos that will explain various aspects of the LHC and the physics questions behind it. These would be freely available on-line.**
- **Coordinated with the development of new materials and activities as described above, we plan to conduct “masterclasses” in which high school students are invited to universities for a day of learning about the LHC and getting some hands-on experience of how an experimental collaboration works.**

Preliminary



**The End**