Exploring the frontiers of knowledge
Explorer les frontières du savoir

Angels, Demons and Black Holes

turning threat to opportunity in science communication

Dr James Gillies, Head of Communications, CERN
IFIC, Valencia, 6 June 2013

Communicating particle physics: The challenge

Shortcuts

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Get great deals on holidays at our new travel auctions website. guardian.co.uk/travelauctions

guardian.co.uk
GuardianUnlimited
think of escaping

The mother who never goes out without her daughters

A royal child's relationship with its parents is always going to be an intriguing one. Take Charles: a middle-aged man whose life purpose cannot commence until his mother pushes off, either off the throne or into the next dimension.

But it's Princesses Beatrice and Eugenie who provide the most fodder for thought on this account. These two young ladies, perfectly pleasant by all accounts, seem to have a relationship with their mother, the indefatigable Fergie, that is so close as to be downright stifling. The three are frequently photographed at parties and premieres together and this week Fergie and her ex-husband were photographed leaving a restaurant together. She did leave the girls at home but they were present in spirit, thanks to Fergie's Anya Hindmarch handbag, which was emblazoned with a picture of her daughters.

For New Year's Eve, Beatrice and Eugenie, 18 and 16 respectively, went to Thailand for the party where Pete Doherty sort-of-but-not-really married Kate Moss. Quite a good gig for two teenagers, you would think. Except that their mother went with them. Fergie has hooted in interviews about how she and Beatrice like to go "on the pull together" and Beatrice recently cooed that her ambition was to be "a mini-mummy [because] her behaviour is one I'd really like to follow". Ah-toe-sucking-choo!

In this day of family breakdowns and the end of the nuclear unit, isn't it heartening to see two teenagers so happily close to their mother? Others have been spotted partying with their mothers, too: Moss herself was photographed at Manumission in Ibiza with her mum. None the less, we all remember what it was like to be 18: the idea of going to a party with one's mother was pretty much up there with joining the after-school physics club in terms of social humiliation. So either they are doing this under sufferance or, as has long been suspected, the royals don't have normal human reactions. This would explain how William and Harry continue to live day to day, seemingly unhampered by their father's once-professed wish to be a female sanitary product when most other people would have fled to Tanzania. But frankly, the thought of Fergie turning up in Manumission is enough to make you beg Beatrice and Eugenie to, please, take a stand now.

Hadley Freeman

Inseparable ... Fergie with Beatrice and Eugenie and, left, her bag with their picture on

In this day of family breakdowns, isn't it heartening to see two teenagers so close to their mother?

PHOTOGRAPH: EMPICS; COVER PHOTOGRAPH: GETTY

2 The Guardian 18.01.07

guardian.co.uk

"We all remember what it was like to be 18: the idea of going to a party with one's mother was pretty much up there with joining the after school physics club in terms of social humiliation.

2004: What does the world know about particle physics?

So what does that tell us?

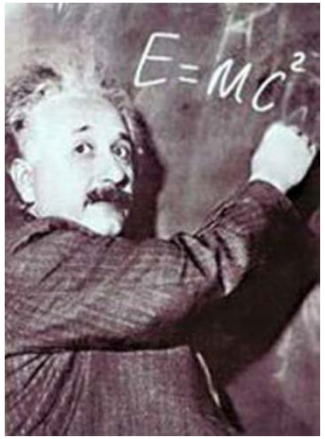
People do not understand what we do
“science is just there” “not a clue” “stone circle”

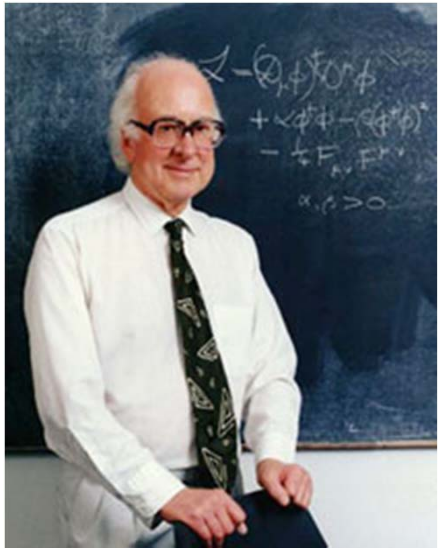
But they think it’s good
“we need to know what’s inside an atom” “a good thing”

It’s perceived as expensive
“it’s a lot of money”

People want to know what’s in it for them
“it will have a practical benefit”

We have great stories to tell





Newton’s unfinished business… what is mass?

Science’s little embarrassment… what is 96% of the Universe made of?

Nature’s favouritism… why is there no more antimatter?

The secrets of the Big Bang… what was matter like within the first second of the Universe’s life?

Are there extra dimensions of space?

We have great stories to tell

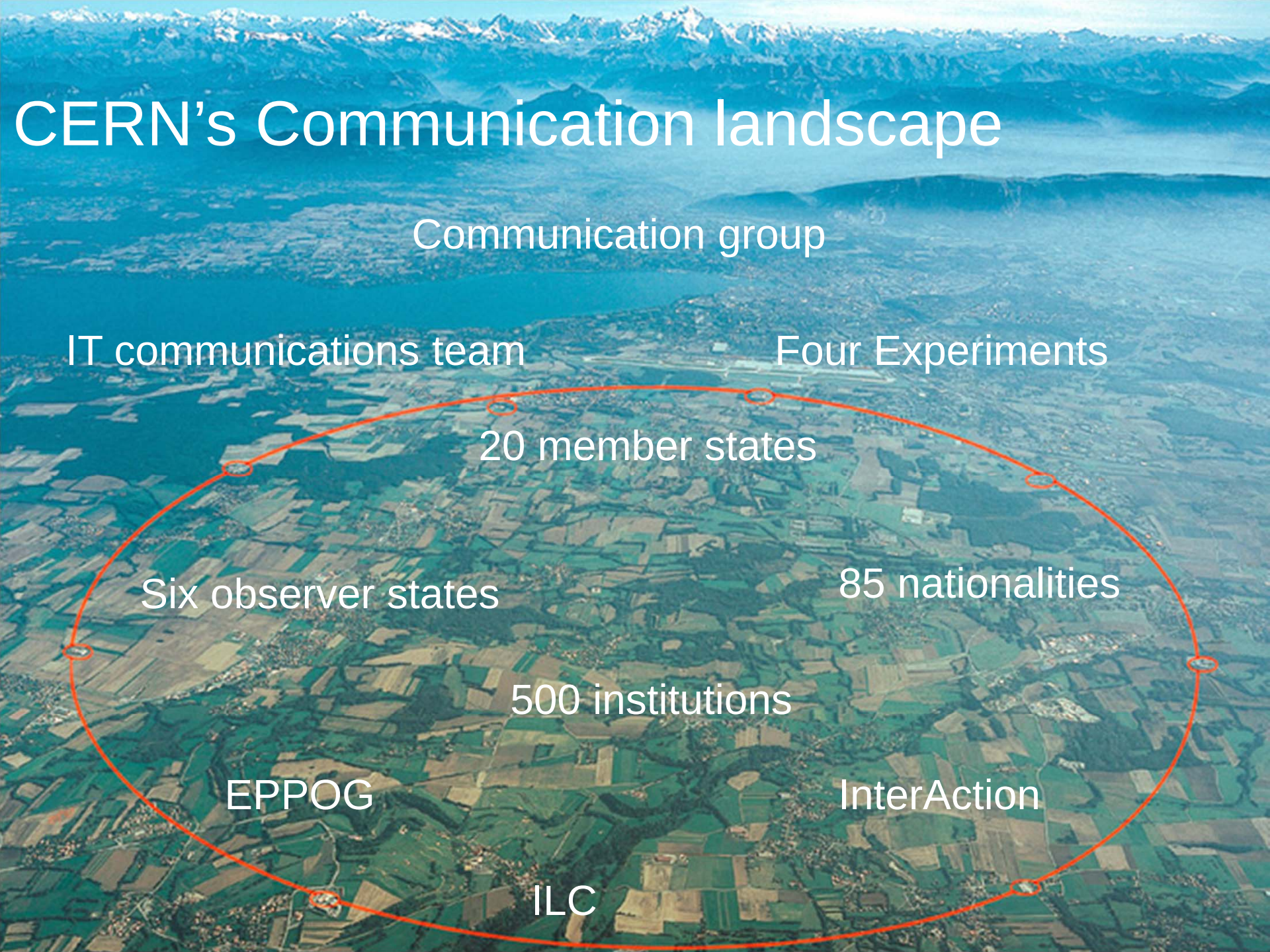
The challenge is, we're not the only ones who want to tell them…

Communicating the LHC …

the view from CERN

James Gillies, 29 November 2005

CERN's Communication landscape

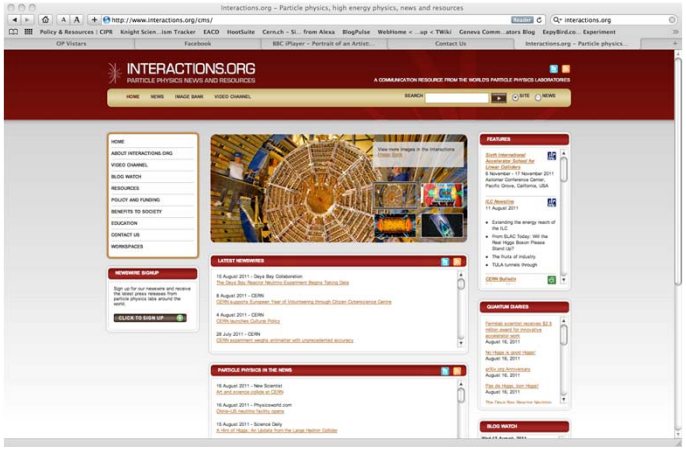


Member States Coordination:

European particle physics communication network

Global Coordination:

InterAction Collaboration
www.interactions.org



In house coordination: LHC outreach group

Advantages of networking

- Agree on joint actions
- Advance notice of press releases and other events
- Inspiration and ideas from colleagues in the network
- A sense of togetherness
- Consistency of messages

The next challenge: Perception versus reality

Perception versus reality

What is CERN?
European Organization for Nuclear Research?
European Laboratory for Particle Physics?

Perception	Reality
CERN is a nuclear lab	Particle physics
CERN does military research	Forbidden
CERN is secretive	Publishes openly
CERN is closed	Open to the public

Much of our intranet is accessible.
Our scientists are encouraged and enabled to communicate.

The best approach?

Transparency!

- Gain trust
- You have no choice
- If it falls down, the world will notice.

Exploring the frontiers of knowledge
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Honest, open, timely = authoritative

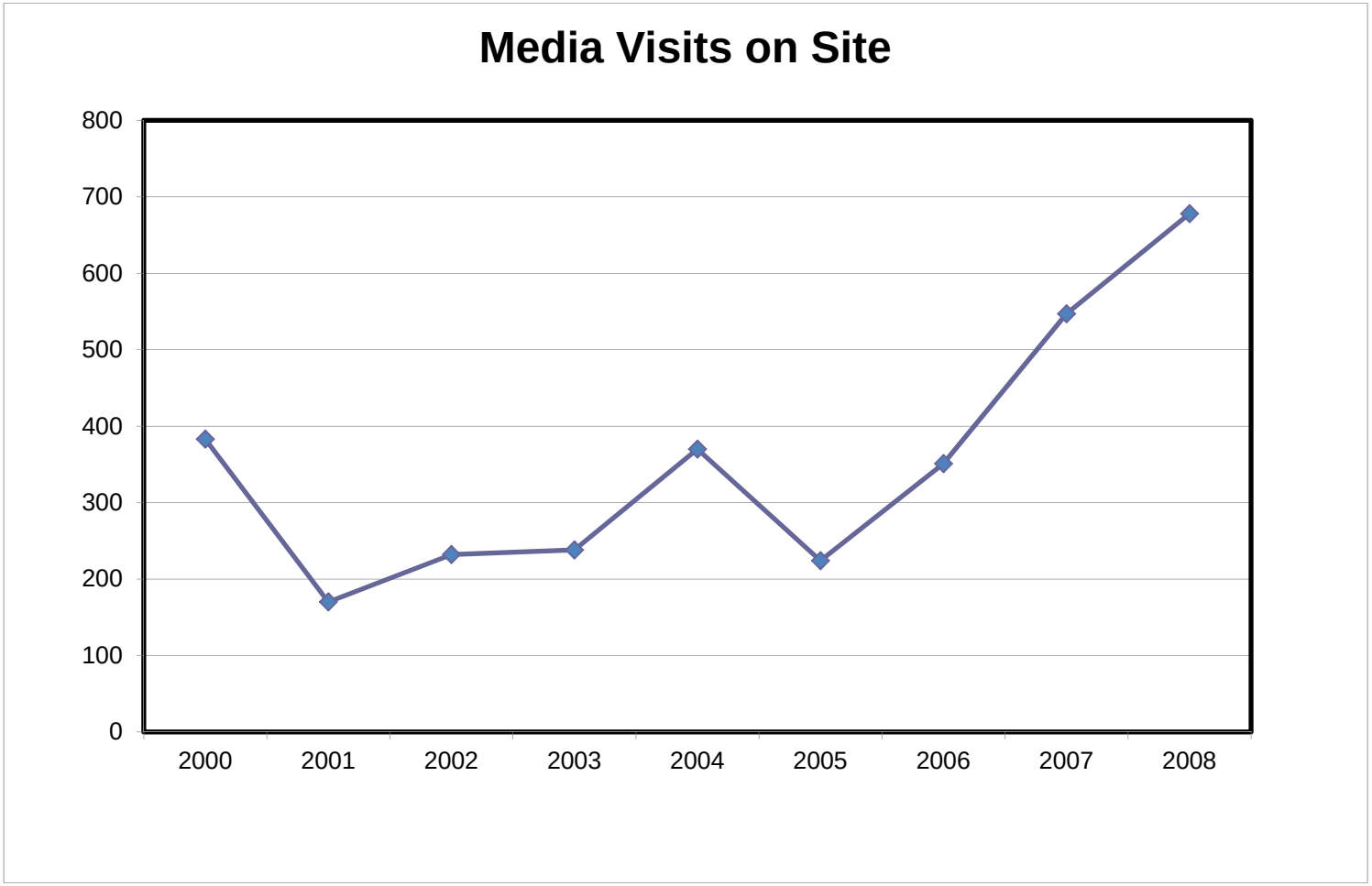
CERN's LHC communication plan

DRAFT 1, 15 January 2005:

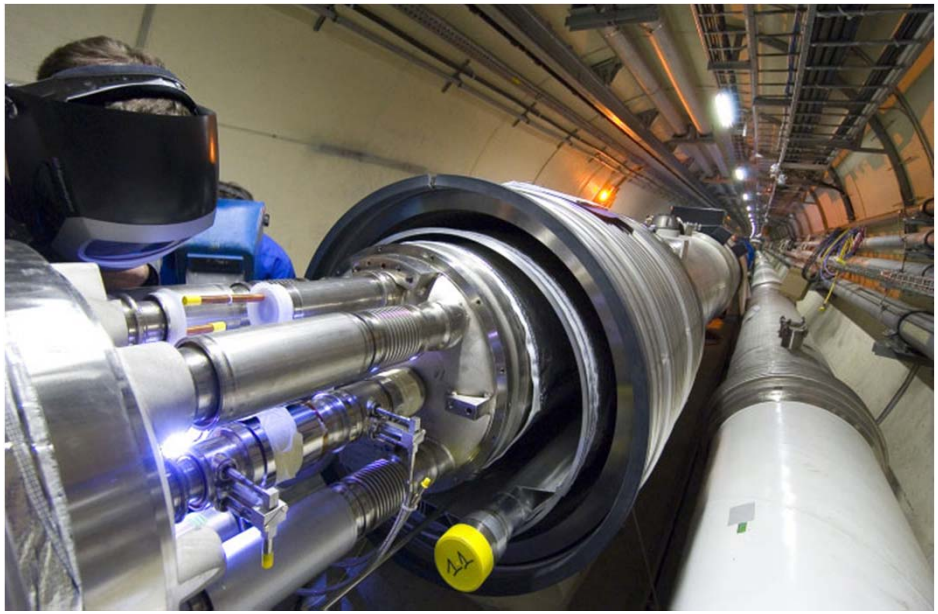
The aim of this plan is to gain maximum benefit in terms of public image for CERN and particle physics world-wide through the unique communications opportunity presented by the start-up of the LHC in 2007, and first results coming in some months later. It is a three-year plan starting in 2006.

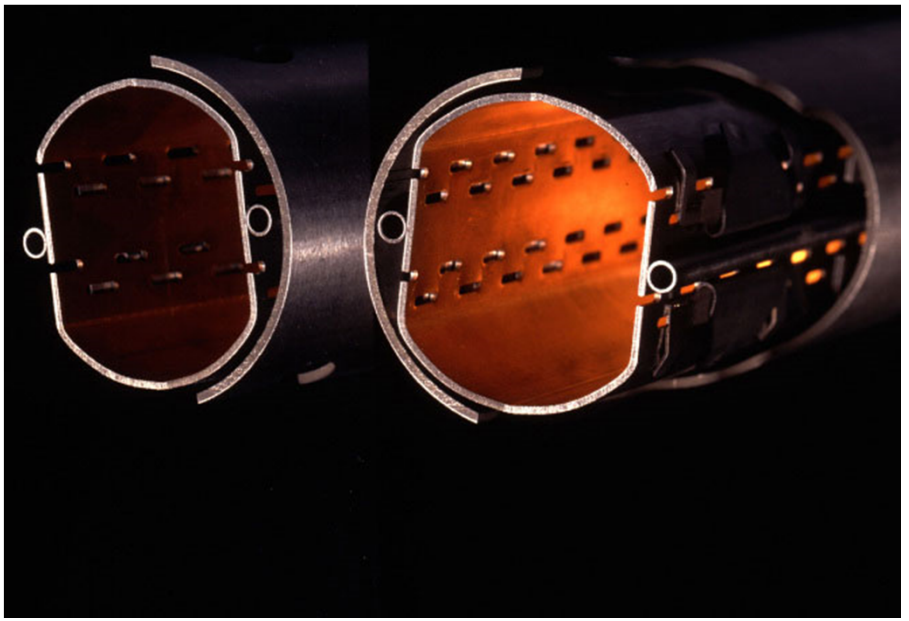
The start up of the LHC provides a unique opportunity to promote these messages, and in addition to position the LHC as a European success story and a global endeavour. It also gives us the opportunity to position fundamental science as a long-range force for innovation through each of CERN's four missions - research and discovery; training; technology; collaboration.

Growing media interest



Key stakeholder targeted events, 2008 and 2010



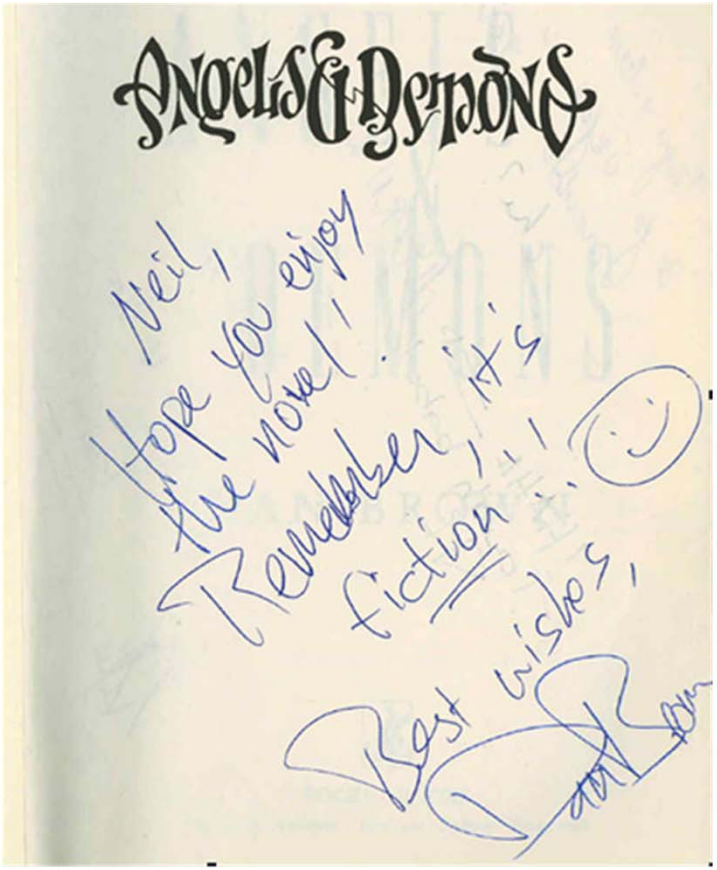


- 5-6 April 2008. Open Days
- 10 September 2008. First Beam
- 21 October 2008. Official Inauguration
- 30 March 2010. First Physics

- Neighbours
- Media
- Political
- Media

What about the Angels & Demons?

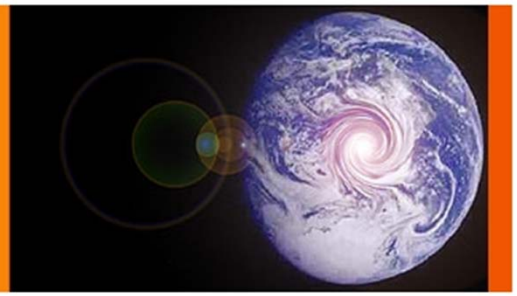
… this arrived on my desk in 2000



… and then came End Day…

FRIDAY FRIDAY

BBC THREE



End Day

- Home
- End Day: Mega-Tsunami
- End Day: Comet Attack
- End Day: Killer Virus
- End Day: Supervolcano

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Documentaries & Arts

End Day: End of the Universe

Deep within the bowels of a particle accelerator on the East Coast of the US, an extraordinary experiment is being prepared. Scientists are pursuing their quest to understand the nature of matter itself. On the streets, the public holds a protest to stop their work...

Fact!
Scientists are experimenting with the very nature of reality itself; building ever larger and more powerful particle accelerators in what could turn out to be a game of total annihilation.

In a 600 million dollar laboratory, within a vast ring of magnets miles across, atoms can be made to travel at the speed of light then crashed to create particles that haven't existed since the Big Bang … and possibly some that have never existed at all.

Scientists accept that black holes can be created but these are small enough to evaporate before they can suck in all surrounding matter. They have also calculated the precise risk of another terrifying possibility: a phase change of space-time leading to the complete breakdown of the universe as we know it.

But most frightening of all is the creation of a group of strange quarks called 'dangerous strangelets'. These are so dense they could burrow to the centre of the Earth, transforming everything they touch into anti-matter, condensing our planet into a tiny lifeless sphere.

They are experimenting right now...

Do you feel safe?

Fiction?
It's **End Day** and within a deep underground chamber physicists have briefly created exotic particles and space-time warps by violently smashing atoms.

But something unforeseen happens. 'Strangelets' appear. Suddenly, the normal laws of physics cease to apply. Reality warps and alters. Atoms are transformed into totally new forms of matter.

The singularity burrows into the Earth, twisting the atomic structure of the surrounding rcoks as it falls into the planet's centre.

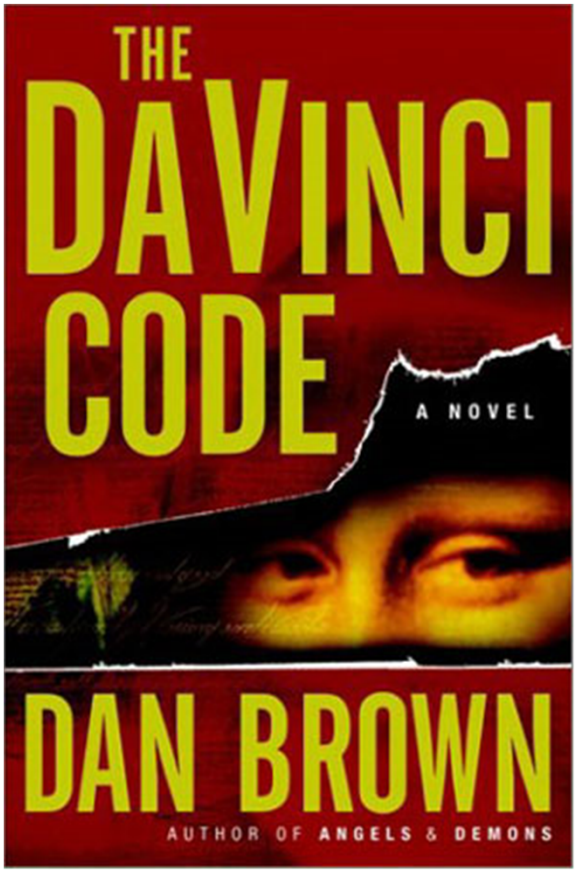
A wave of total destruction expands outwards, consuming everything in its path. Life ends. The Earth vanishes...

The universe as we know it ceases to exist.

The story of one day…

Reassuring physicist…

… and then came The Da Vinci Code



It was time for CERN to act…

True or false?

CERN has a space plane.	✗
CERN makes antimatter.	✓
Georges Charpak played frisbee.	✗
Antimatter could solve the energy crisis.	✗
Antimatter is used in PET scanners.	✓
Technology for PET scanners is developed at CERN.	✓

2007: a visit from Ron Howard…

…led to a contract with Sony…

WORKING DRAFT 24-01-08 - without prejudice

AGREEMENT

BETWEEN

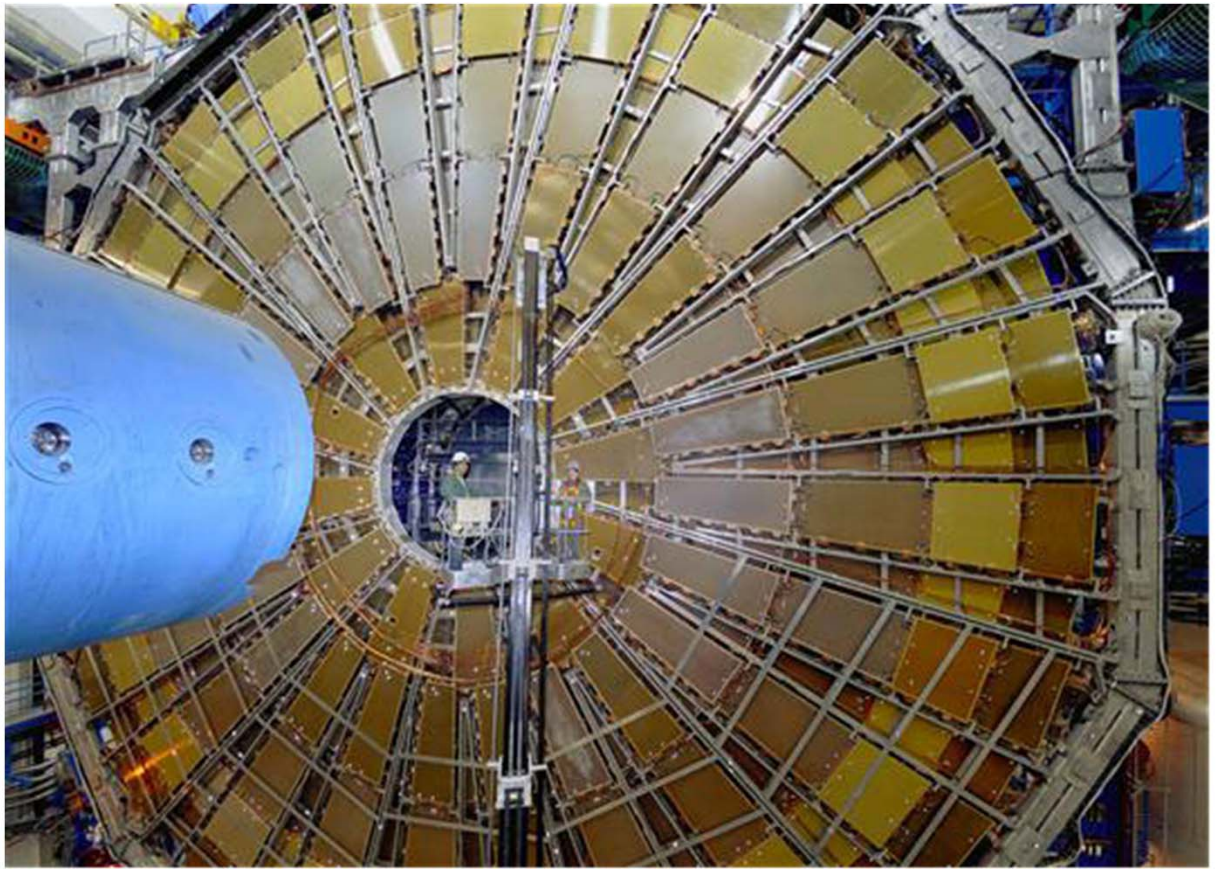
OBELISK PRODUCTIONS LIMITED
(OBELISK)

AND

THE EUROPEAN ORGANIZATION
FOR NUCLEAR RESEARCH
(CERN)

2008

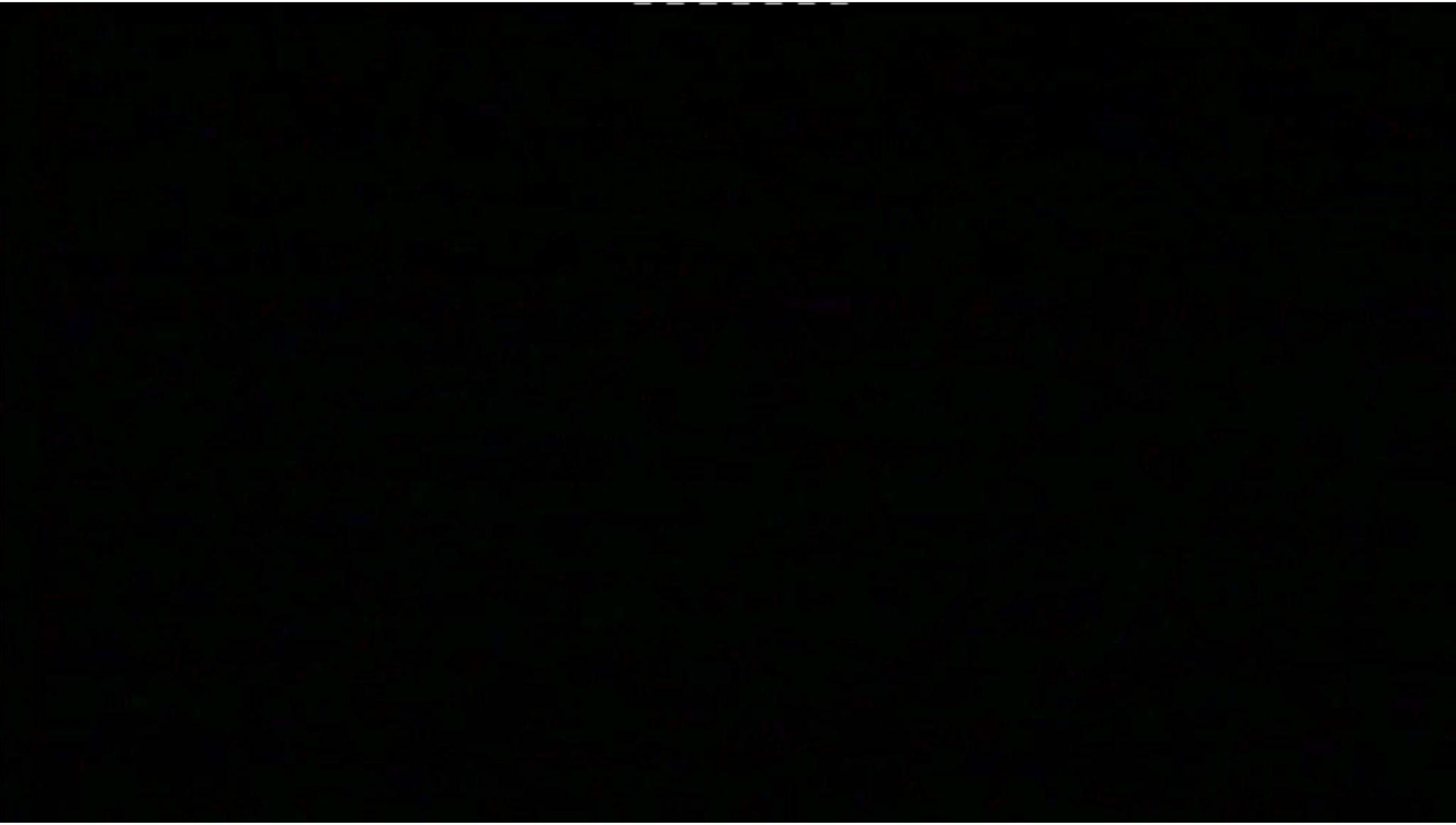
…some filming…



…and a big media junket at CERN

We did tie-ins with the launch, and we're on the BluRay disk

Antimatter – according to Hollywood



What's wrong with that clip?

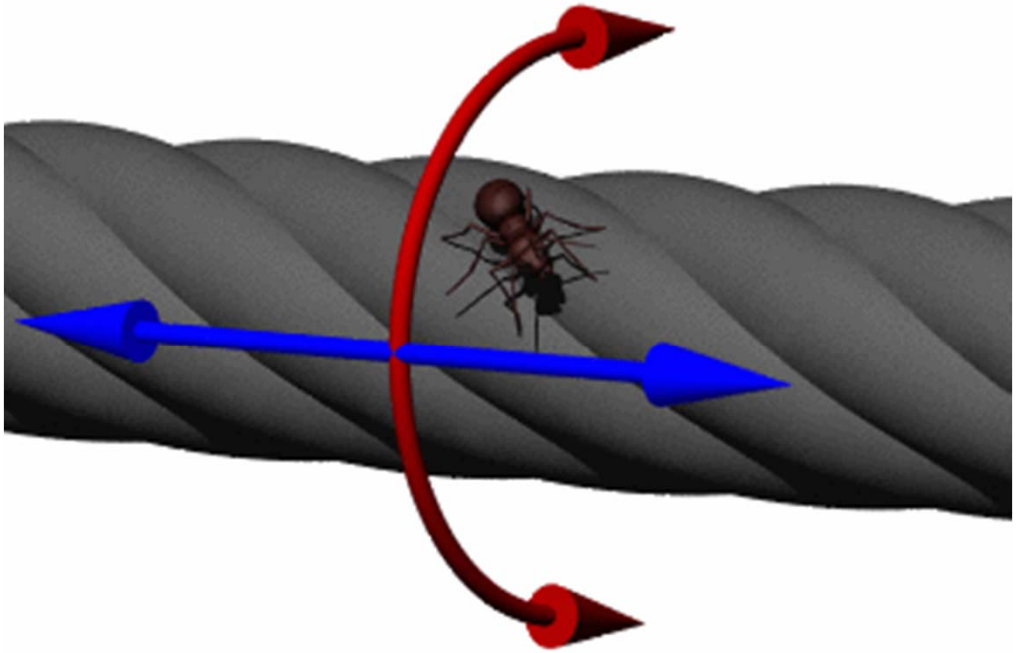
Particles leave visible tracks in air.	✗
Antimatter is produced in the LHC.	✓
How much do we produce per year?	1 nanogramme
How long would it take to produce the quantity held in a canister in the film?	~250,000,000 years
The control room overlooks the experiment.	✗
Physicists really say such things.	~✓

And Earth eating Black Holes?

Defying gravity

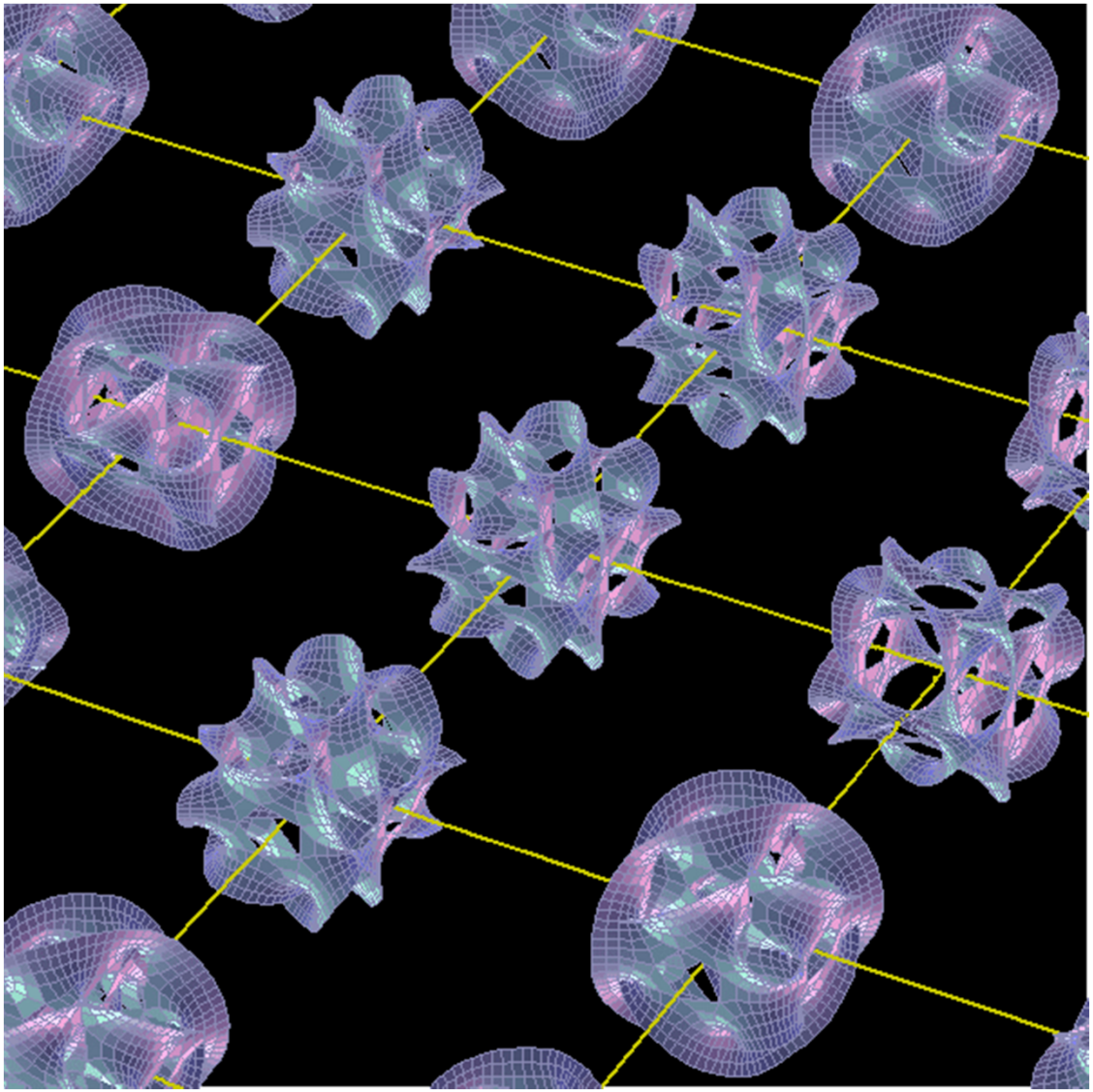
Interaction	Relative strength
Strong	1
Electromagnetic	1/137
Weak	10^{-6}
Gravity	10^{-39}

What's behind micro Black Holes?

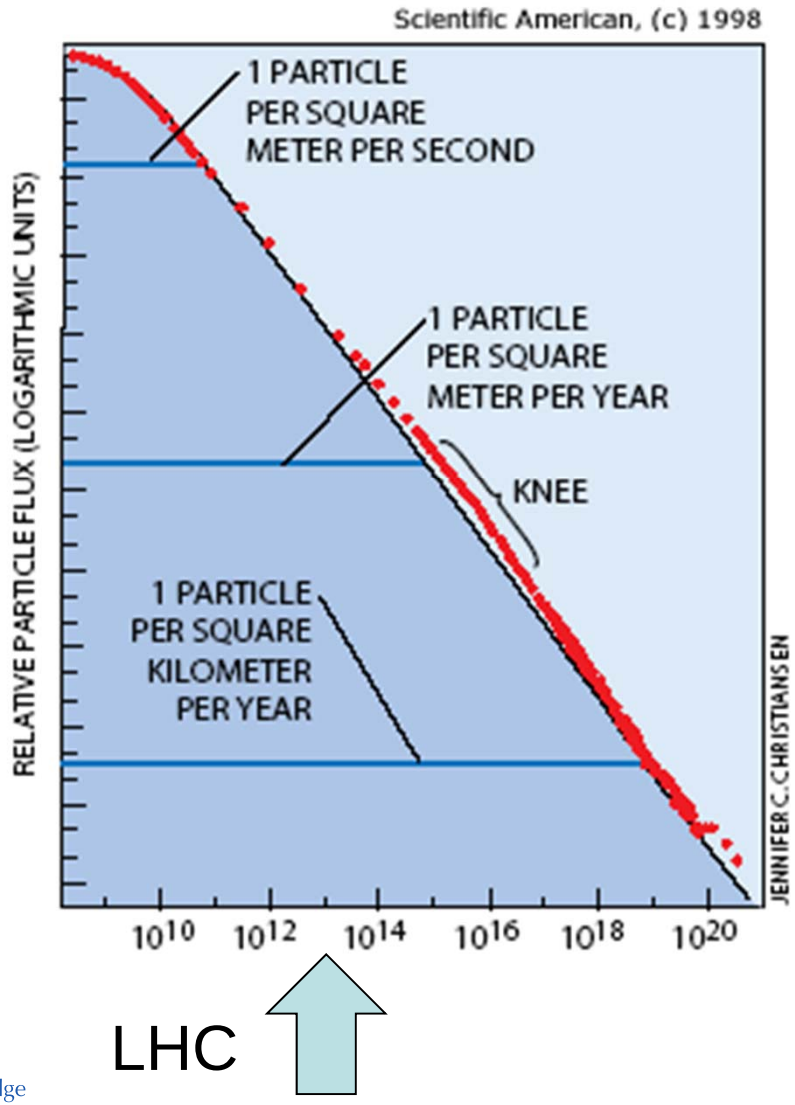


Einstein Online **Vol. 4 (2010), 1013**

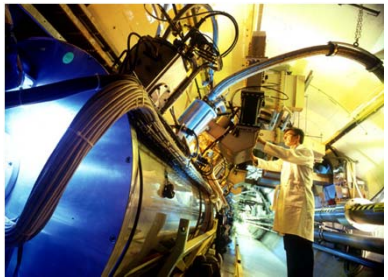
What's behind micro Black Holes?



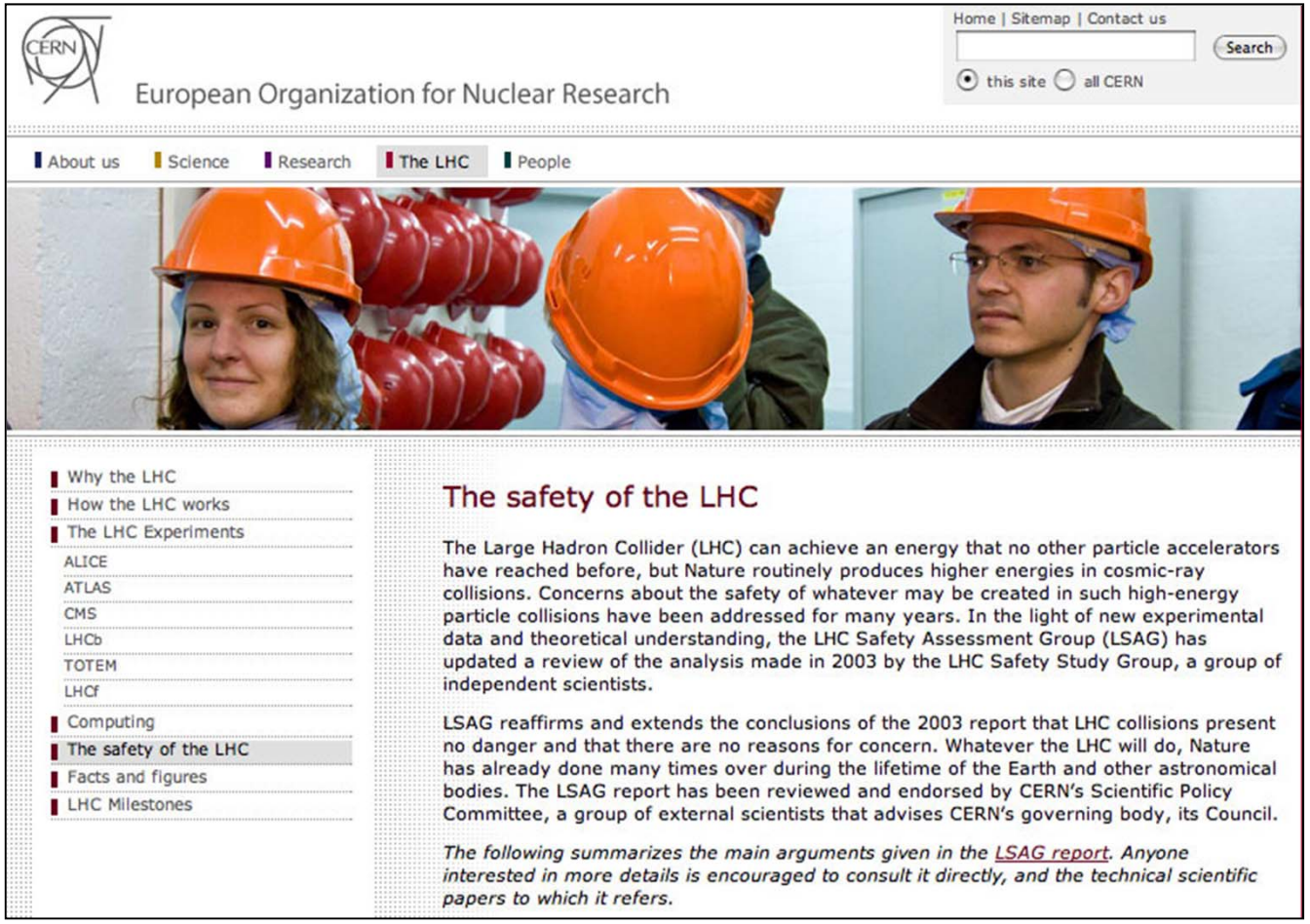
The Cosmic Ray Spectrum



They’ve always been there..

	Year	Machine	Web	Hype
	1989	LEP	None	None
	1999	RHIC	Web 1.0	Little
	2008	LHC	Web 2.0	Lots

CERN played it low key…



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  - CMS
  - LHCb
  - TOTEM
  - LHCf
- Computing
- The safety of the LHC
- Facts and figures
- LHC Milestones

The safety of the LHC

The Large Hadron Collider (LHC) can achieve an energy that no other particle accelerators have reached before, but Nature routinely produces higher energies in cosmic-ray collisions. Concerns about the safety of whatever may be created in such high-energy particle collisions have been addressed for many years. In the light of new experimental data and theoretical understanding, the LHC Safety Assessment Group (LSAG) has updated a review of the analysis made in 2003 by the LHC Safety Study Group, a group of independent scientists.

LSAG reaffirms and extends the conclusions of the 2003 report that LHC collisions present no danger and that there are no reasons for concern. Whatever the LHC will do, Nature has already done many times over during the lifetime of the Earth and other astronomical bodies. The LSAG report has been reviewed and endorsed by CERN's Scientific Policy Committee, a group of external scientists that advises CERN's governing body, its Council.

The following summarizes the main arguments given in the LSAG report. Anyone interested in more details is encouraged to consult it directly, and the technical scientific papers to which it refers.

…at least at first.

Daily Show Does CERN

Stumble! Like?

If you watch the Daily Show, you know the ~~inane~~ humor of John Oliver, one of the regular "corespondents" on the show. My colleagues at CERN tell me that he's visiting CERN now, filming one of his inimitable segments on the LHC and the experiments, to be aired "some time after April 21". Personally, I can't wait to see it - he is always funny and usually pretty sharply barbed. He apparently rode an LHC dipole magnet like Slim Pickens rode the bomb in Dr. Strangelove, and asked one of our guys "is there anything you do here that's *not* boring?" His video spots are always edited tightly to get the maximum laugh quotient. Anyway, here he is in the CMS cavern, earlier today (thanks to my student Matt Searle for the photo!)

ShareThis

April 8th, 2009 by John **in** Miscellany, Science and the Media | **14 comments** | RSS feed | Trackback >

The Lion, the Witch and the Black Hole

“Once we stop these guys at CERN then we have to ban wardrobes. We shouldn't be taking the chance of people ending up in Narnia!”

Blog posting, 30 March 2008

The perilous world of the wardrobe

Last spring a man called Walter Wagner claimed that if you can conceive of two possible outcomes to an event, then the probability of each one happening is 50:50. His pronouncement came in an episode of *The Daily Show*, a US satirical news TV programme, but he was not trying to be funny. Wagner, a plaintiff in a 2008 court case in Hawaii that tried to prevent CERN from switching on the Large Hadron Collider (LHC), has long believed that experiments at the collider could cause the world to go up in a puff of smoke. And the probability of this happening, as conceived by Wagner, is one in two. Scary.

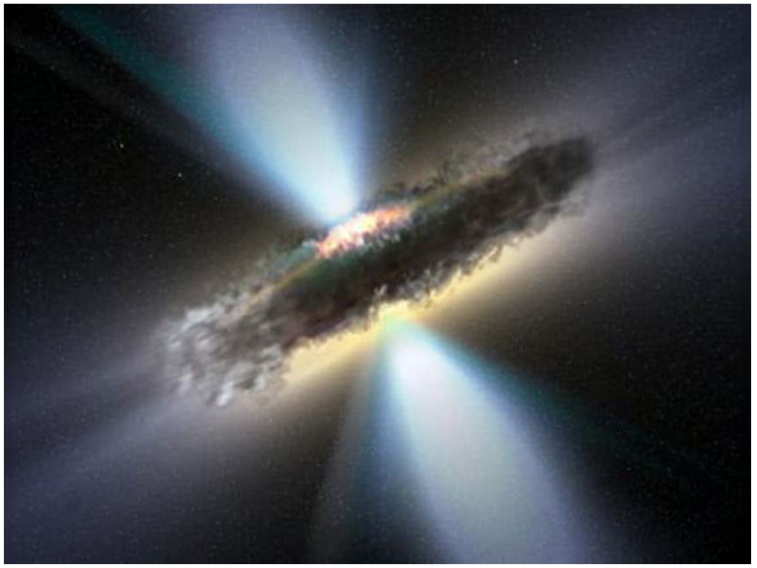
Happily for the continued existence of the world, statistics is not so simple a science as Wagner's interpretation would suggest. True, if you flip a coin, the chances that it will land on heads or tails are indeed 50:50, unless the coin is loaded. But what about the LHC? What are the real chances of it creating a world-eating black hole?

First, let's consider a truly dangerous object: wardrobes. Yes, wardrobes. I am not thinking of the dangers of being trapped by falling furniture, which are undoubtedly real,

Photolibrary

Would we do the same again?

CERN in fiction…



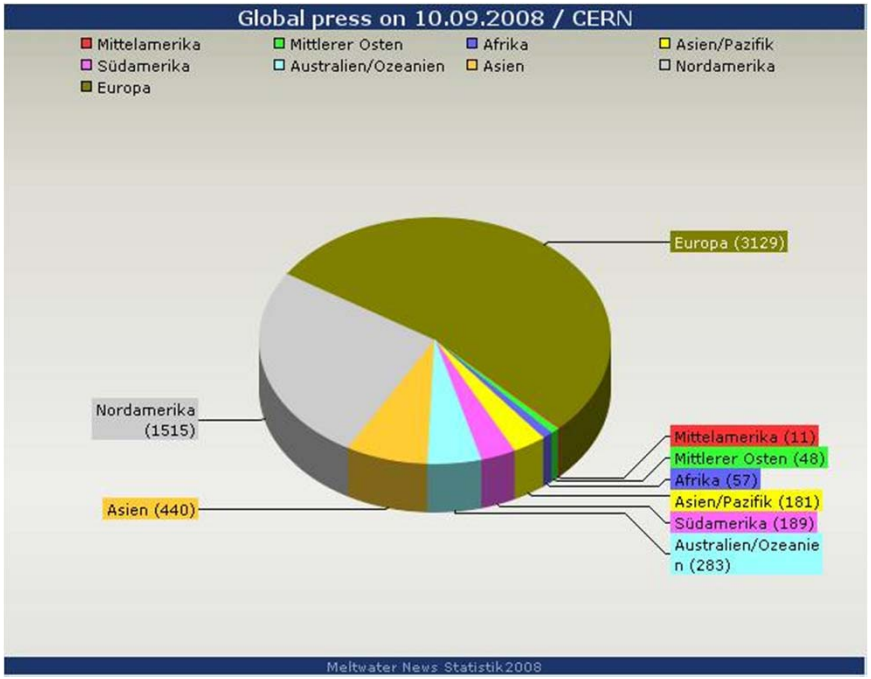
CERN in fiction dressed up as fact…

Both helped us tell our story.
With hindsight, we'd have treated them much the same way.

The overall result…

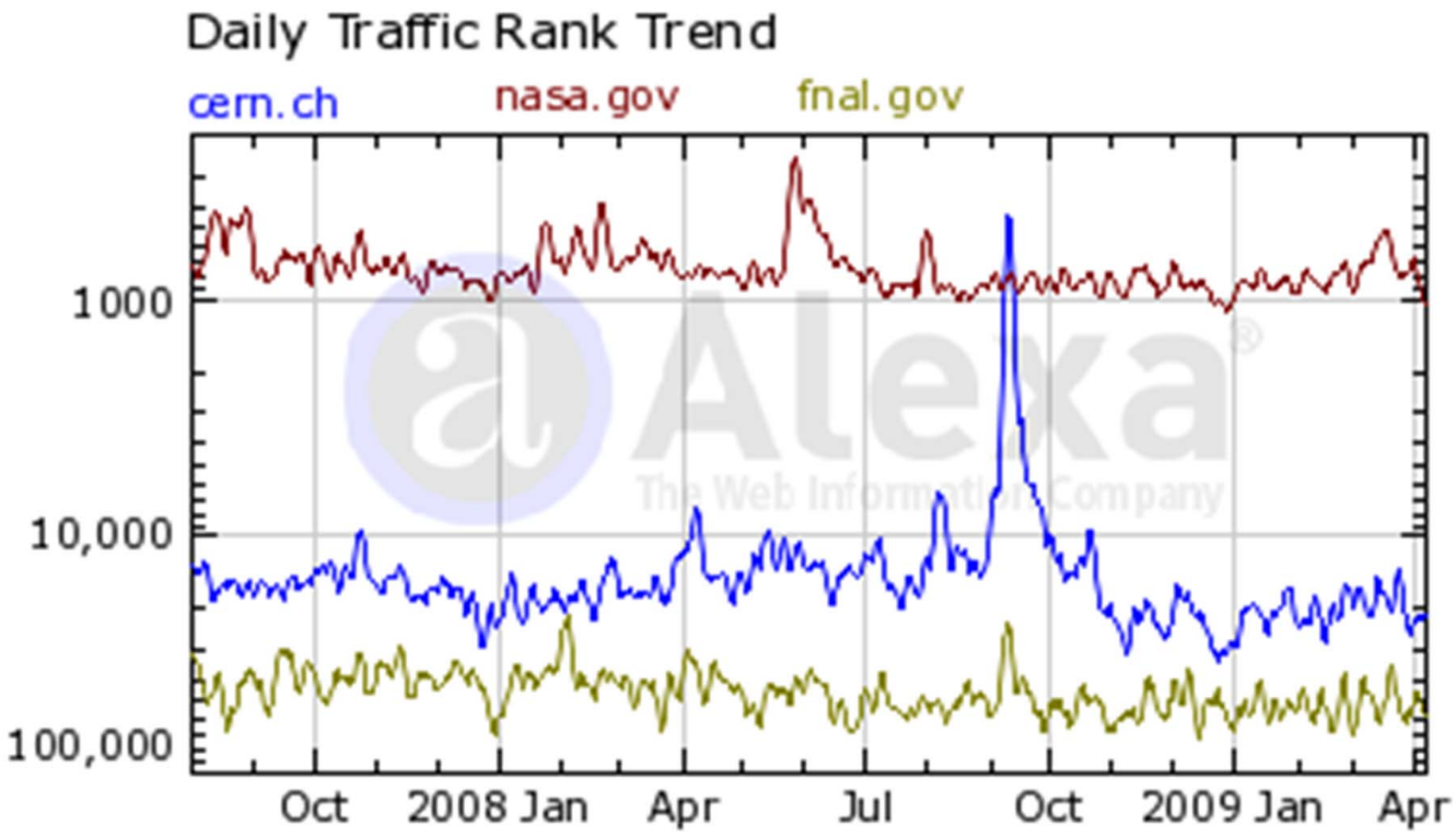
10 September 2008

- **340 media outlets on site**
- **450 broadcasters**
- **2500 transmissions**
- **91 stand-ups**
- **Audience in hundreds of millions**

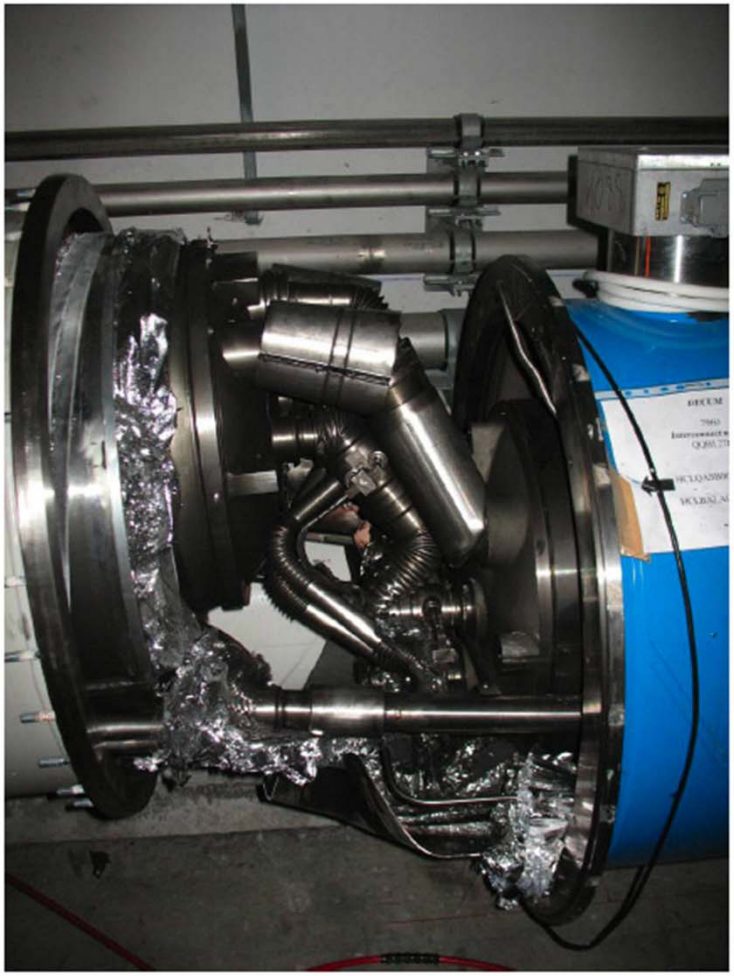


"CERN is the new NASA!"

… well, for a couple of days at least…



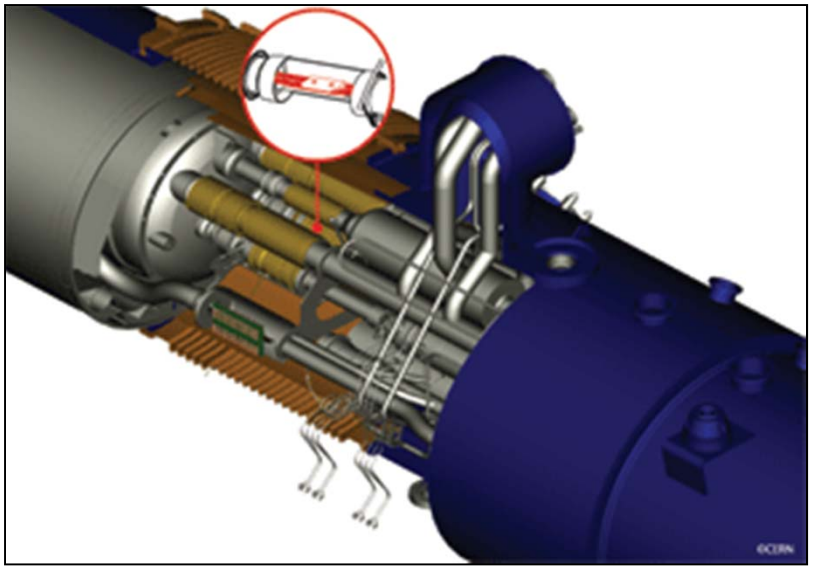
But then this happened…



What we did…

Timeline…

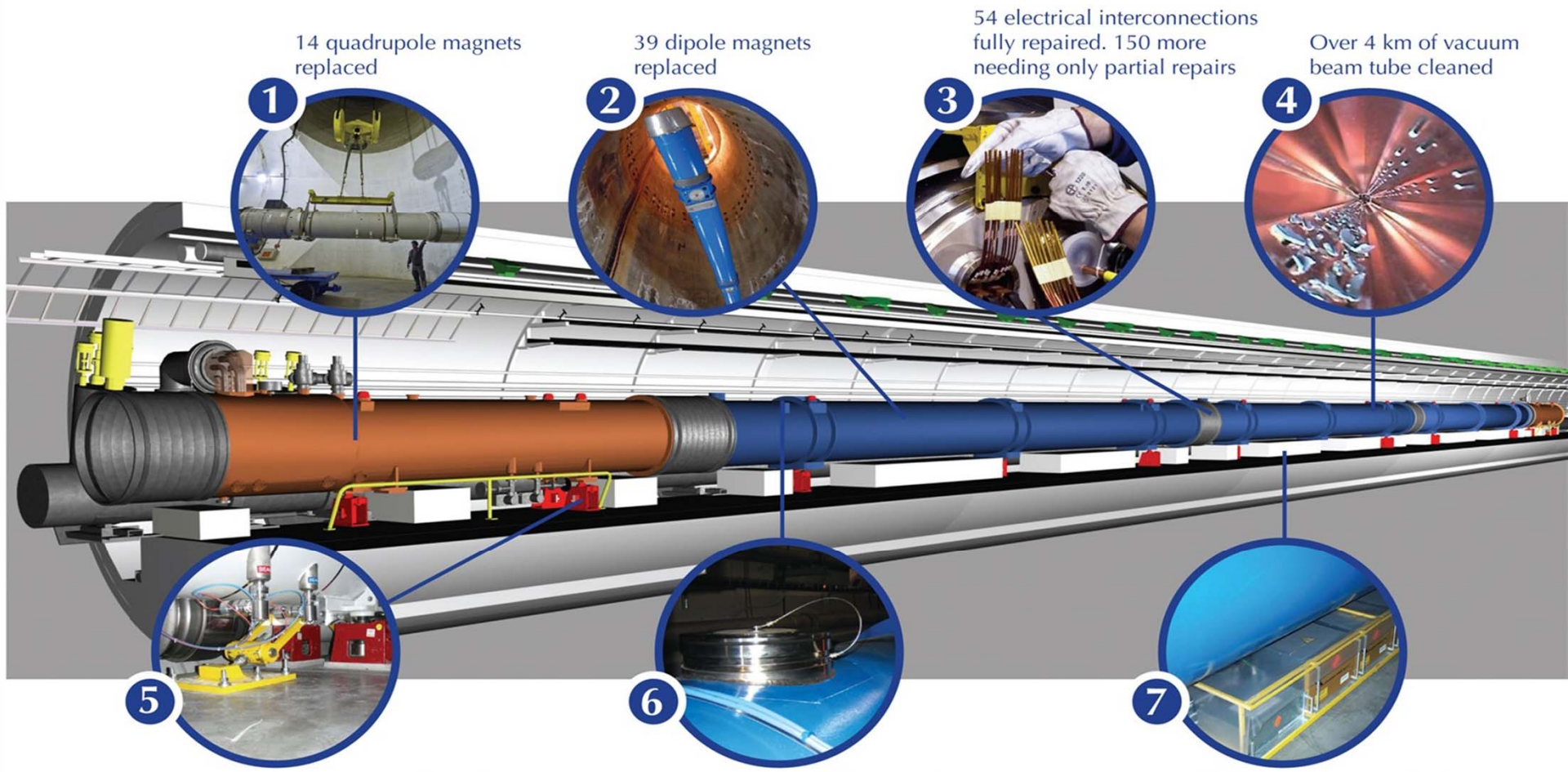
- 10 September 2008: First Beam
- 19 September 2008: Breakdown
- 20 September 2008: First communication of breakdown: Incident in LHC sector 3-4
- 23 September 2008: LHC restart scheduled for 2009
- 16 October 2008: CERN releases analysis of LHC incident
- 5 December 2008: LHC to restart in 2009



Timeline…

- 12 December 2008: CERN Council rings the changes
- From January 2009: Word from the DG every two weeks
- From June 2009: LHC news videos
- 20 November 2009: The LHC is back
- 23 November 2009: First Collisions in the LHC
- 30 November 2009: LHC sets world record
- 30 March 2010: First Physics

The LHC repairs in detail



1. 14 quadrupole magnets replaced
2. 39 dipole magnets replaced
3. 54 electrical interconnections fully repaired. 150 more needing only partial repairs
4. Over 4 km of vacuum beam tube cleaned
5. A new longitudinal restraining system is being fitted to 50 quadrupole magnets
6. Nearly 900 new helium pressure release ports are being installed around the machine
7. 6500 new detectors are being added to the magnet protection system, requiring 250 km of cables to be laid

CERN

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How did we do?

6/10?

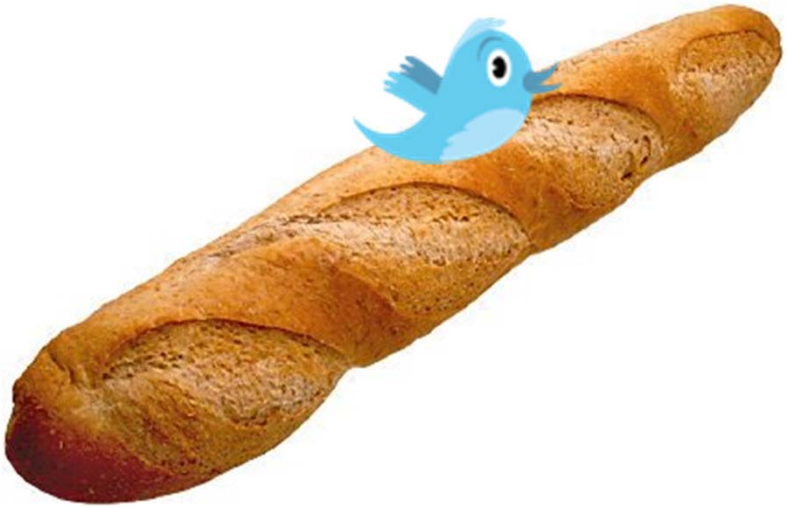
We were usually too optimistic in our prognosis.

23 September to 16 October is a long time…

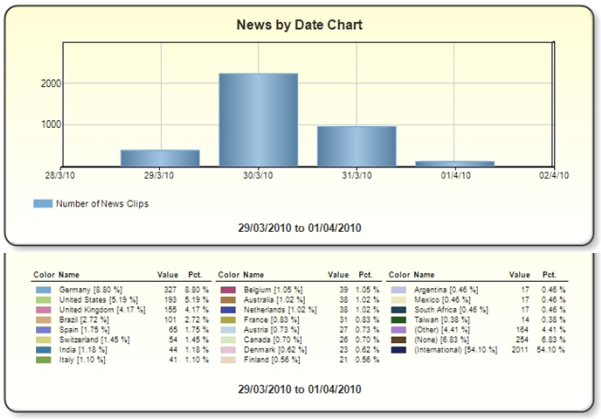
2009: The new NASA?

Global language monitor…

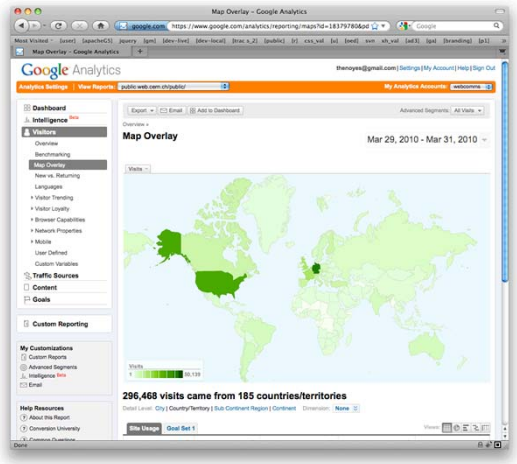
Word of the year: twitter, but hadron came in at number 8
Phrase of the year: king of pop, but god particle came in at 10
Name of the Year: Barak Obama, but LHC was number 4



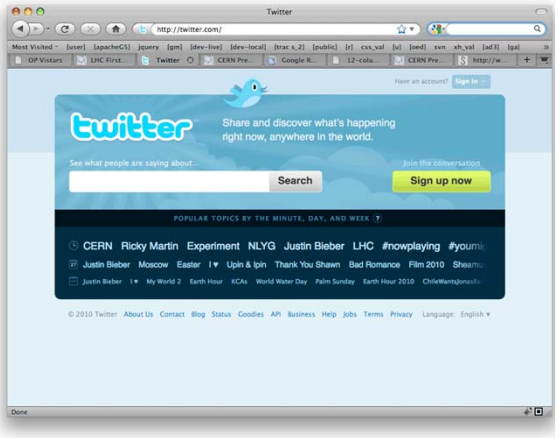
30 March 2010



- 231 peak simultaneous connections to CERN's HQ broadcast (from LHC institutes)
- The CERN LHC First Physics webcast was visited by 700,000 unique computers (IP addresses)
- GroovyGecko CEO: "make no mistake, this was a huge webcast"
- Yospace mobile streaming: 3,521 stream requests

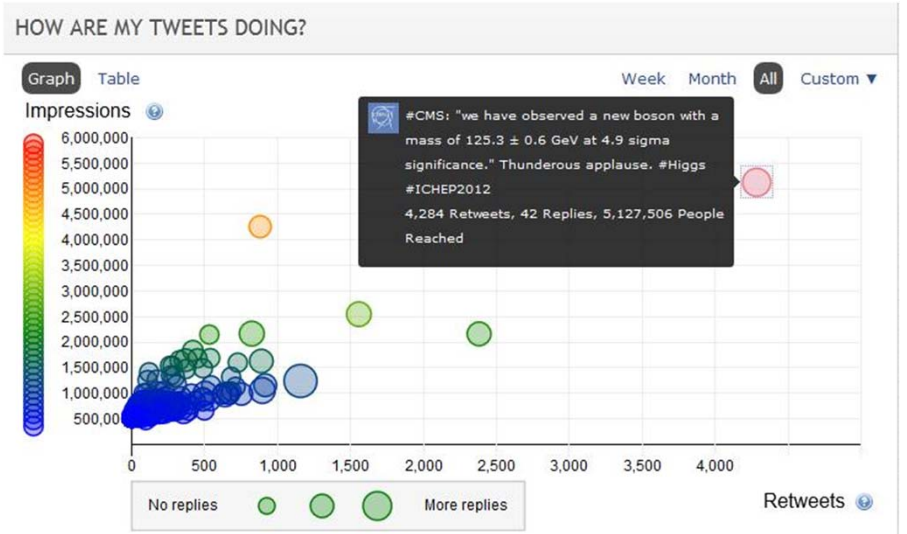


- CERN's public homepage recorded 205,000 visitors (unique IPs) from 185 countries. Normal average 10,000 visitors per day
- The Press Office site recorded 154,000 visitors. Normal average 2,000 per day



- CERN went from 90,000 to 120,000 followers during the day
- Keywords "LHC", "CERN", "TeV" and "experiment" were all global trends on Twitter at some point during the day

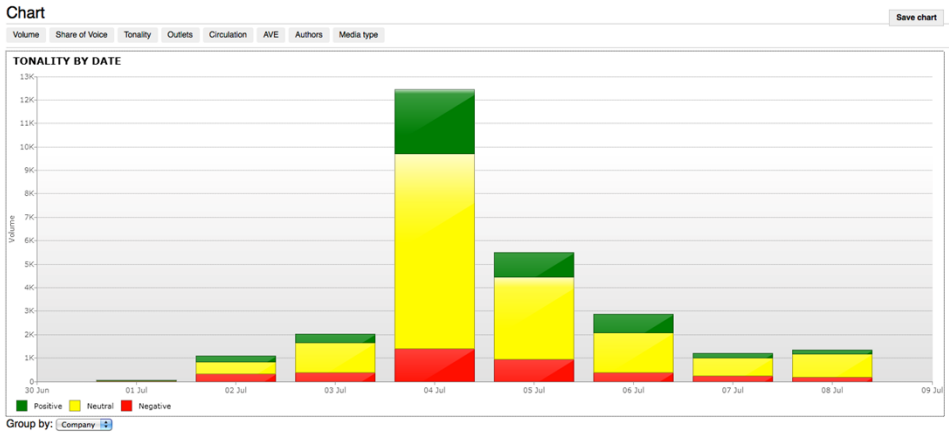
4 July 2012



Close to half a million IPs, live blog, chat room

Tweets reach 5 million

Thousands of cuttings



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Explorer les frontières du savoir

Today’s challenges…

CERN communication strategy 2012-2016

Purpose

The purpose of this strategy is to capitalise on CERN's current visibility in order to generate sustained support for, and engagement with, CERN's scientific and societal missions. An additional purpose is to use this unique opportunity to firmly embed science in to mainstream culture.

Thirst for information

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At Particle Lab, a Tantalizing Glimpse Has Physicists Holding Their Breaths

By DENNIS OVERBYE
Published: April 5, 2011

Physicists at the Fermi National Accelerator Laboratory are planning to announce Wednesday that they have found a suspicious bump in their data that could be evidence of a new elementary particle or even, some say, a new force of nature.

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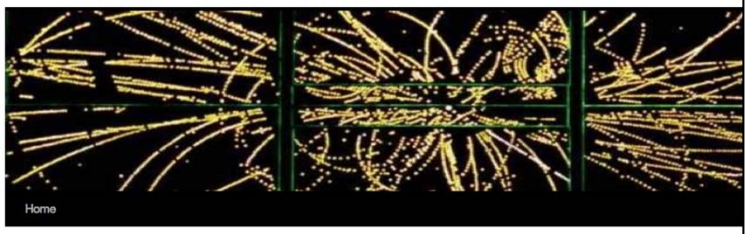
The results, if they hold up, could be a spectacular last hurrah for Fermilab's Tevatron, once the world's most powerful particle accelerator and now slated to go dark forever in September or earlier, whenever Fermilab runs out of money to operate it.

"Nobody knows what this is," said Christopher Hill, a theorist at Fermilab who was not part of the team. "If it is real, it would be the most significant discovery in physics in half a century."

Not Even Wrong



← This Week's Hype Short Items →

This Week's Rumor

Posted on April 21, 2011 by woit

A commenter on the previous posting has helpfully given us the abstract of an internal ATLAS note claiming observation of a resonance at 115 GeV. It's the sort of thing you would expect to see if there were a Higgs at that mass, but the number of events seen is about 30 times more than the standard model would predict. Best guess seems to be that this is either a hoax, or something that will disappear on further analysis. But, since spreading well-sourced rumors is more or less in the mission statement of this blog, I think I'll promote this to its own posting. Here it is:

Internal Note
Report number ATL-COM-PHYS-2011-415
Title Observation of a γγ resonance at a mass in the vicinity of 115 GeV/c2

Not Even Wro

Reviews

Errata

Categories

- Book Reviews
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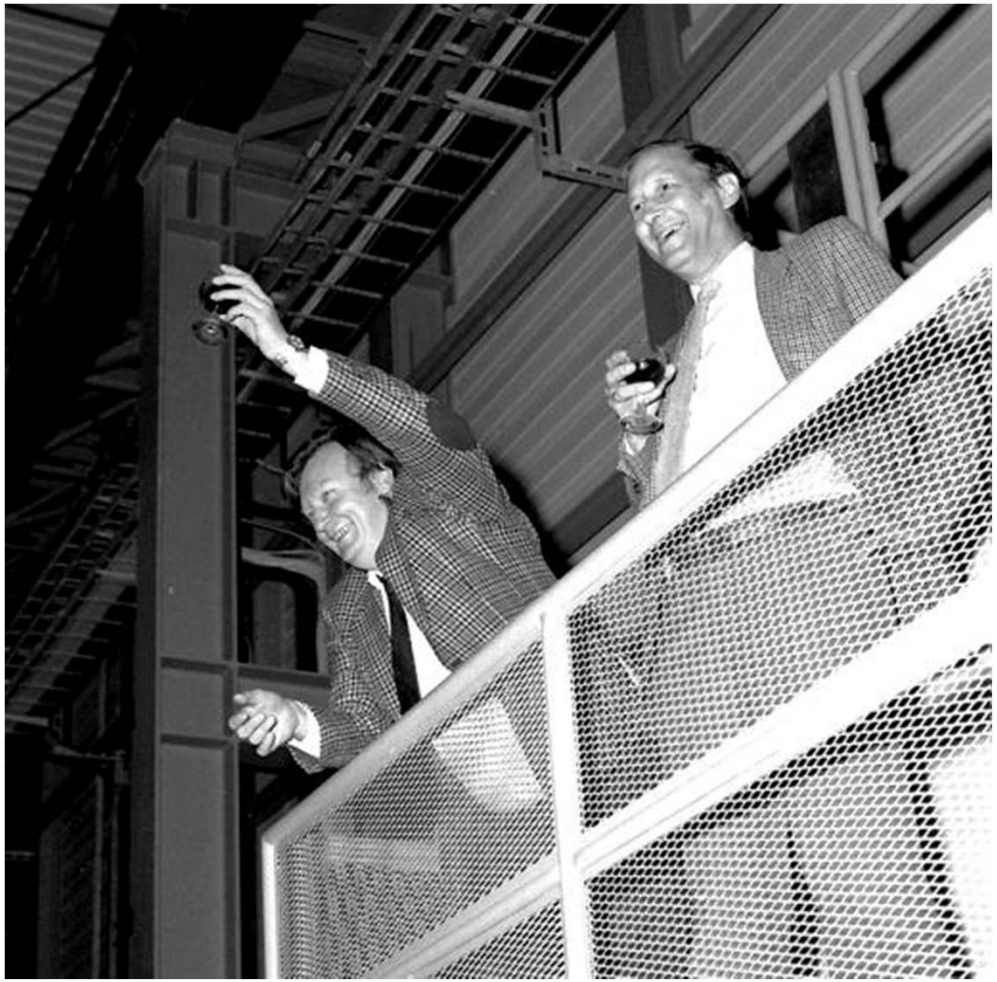
This doesn’t happen in particle physics…

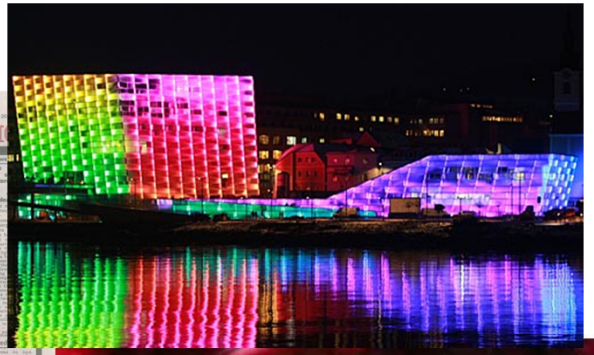
… so we want to bring people along for the ride

This won’t happen at CERN…



…but we will still make the formal announcement there…

Broad engagement



Look out for…

Making that headline come true!

"The troubles of the mountains lie behind us. Before us lie the troubles of the plains."
- Bertolt Brecht


Thank you!