

مرحباً بكم – Welcome

**Professor Khaled Toukan
SESAME Director & Chairman of the
Jordan Atomic Energy Commission
Hashemite Kingdom of Jordan**

to



Accelerating Science and Innovation

CERN was founded 1954: 12 European States Today: 20 Member States



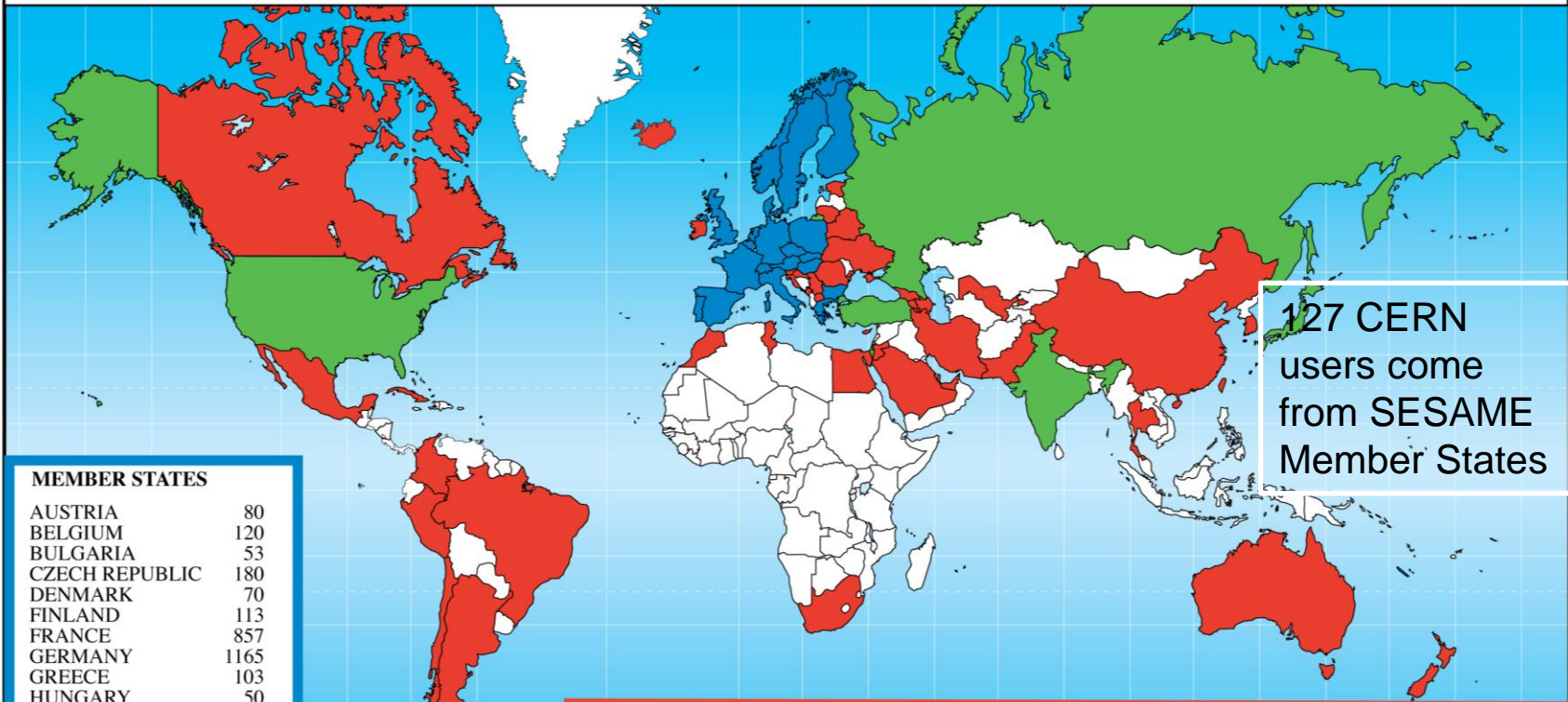
- ~ 2340 staff
- ~ 840 other paid personnel
- > 10000 users
- Budget (2010) ~1100 MCHF

- **20 Member States:** Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.
- **8 Observers to Council:** India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and UNESCO

CERN in Numbers



Distribution of All CERN Users by Nation of Institute on 2 July 2010



MEMBER STATES

AUSTRIA	80
BELGIUM	120
BULGARIA	53
CZECH REPUBLIC	180
DENMARK	70
FINLAND	113
FRANCE	857
GERMANY	1165
GREECE	103
HUNGARY	50
ITALY	1409
NETHERLANDS	170
NORWAY	87
POLAND	189
PORTUGAL	137
SLOVAKIA	59
SPAIN	318
SWEDEN	70
SWITZERLAND	378
UNITED KINGDOM	713

OBSERVER STATES

INDIA	106
ISRAEL	46
JAPAN	177
RUSSIA	849
TURKEY	77
USA	1774

OTHERS

ARGENTINA	9	CROATIA	15	MACEDONIA, F.Y.R.	1	SERBIA	22
ARMENIA	13	CUBA	4	MALTA	1	SLOVENIA	24
AUSTRALIA	18	CYPRUS	8	MEXICO	35	SOUTH AFRICA	8
AZERBAIJAN	1	EGYPT	5	MONTENEGRO	1	THAILAND	2
BELARUS	22	ESTONIA	11	MOROCCO	6	TUNISIA	1
BRAZIL	79	GEORGIA	10	NEW ZEALAND	10	UKRAINE	17
CANADA	159	ICELAND	1	PAKISTAN	19	U.A.E.	1
CHILE	5	IRAN	16	PALESTINIAN TERR.	1	UZBEKISTAN	1
CHINA	77	IRELAND	13	PERU	2		
CHINA (TAIPEI)	49	KOREA	59	QATAR	1		
COLOMBIA	12	JORDAN	1	ROMANIA	58		
		LITHUANIA	10	SAUDI ARABIA	1		

6321

3029

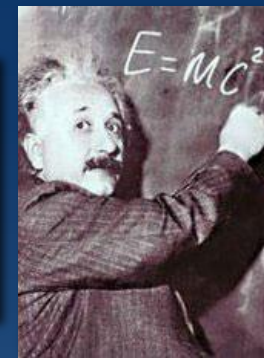
810



The Mission of CERN

- **Push back** the frontiers of knowledge

E.g. the secrets of the Big Bang ...what was the matter like within the first moments of the Universe's existence?

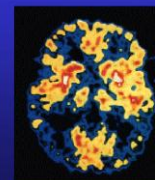
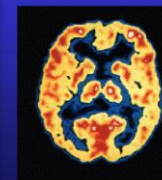


- **Develop** new technologies and **Build** advanced accelerators and detectors

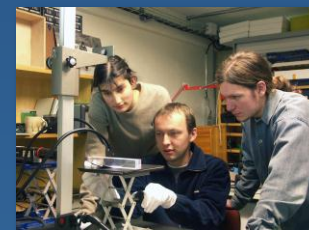
Information technology - the Web and the GRID
Medicine - diagnosis and therapy



Brain Metabolism in Alzheimer's Disease: PET Scan

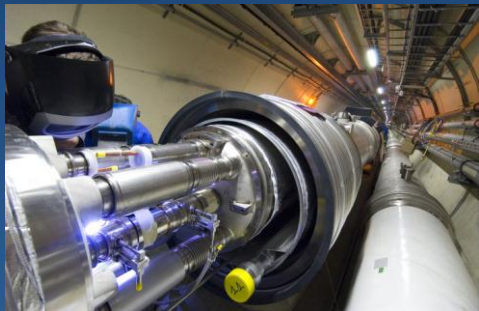
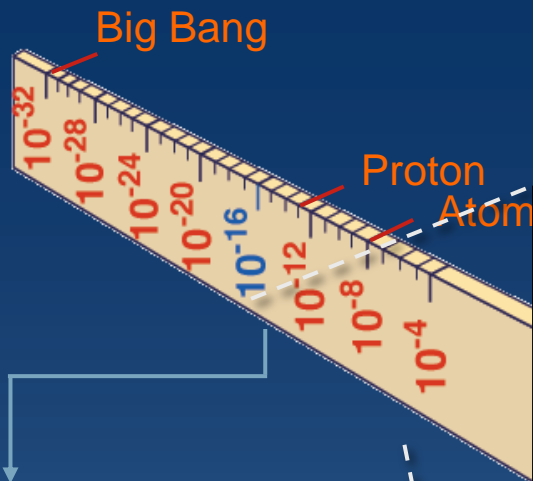


- **Train** scientists and engineers of tomorrow

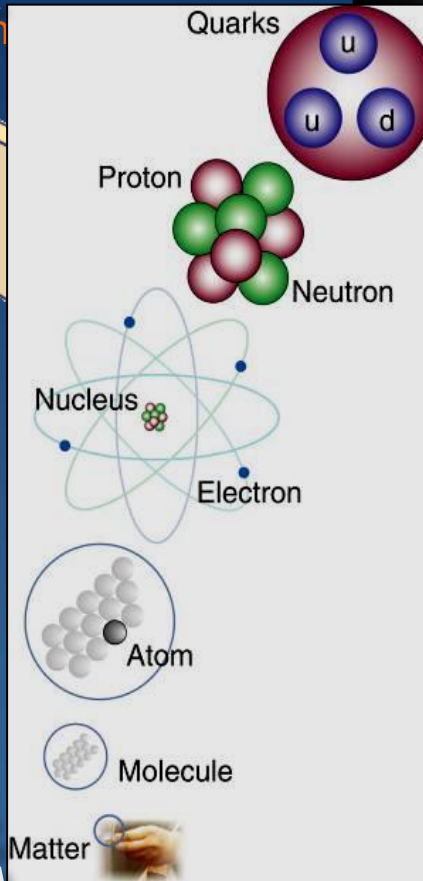


- **Unite** nations & people from different cultures around peaceful science

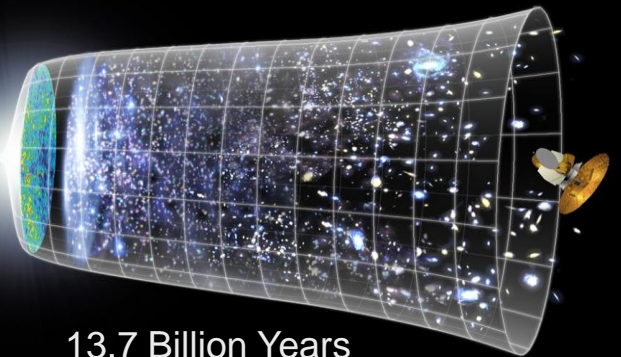




LHC



Big Bang

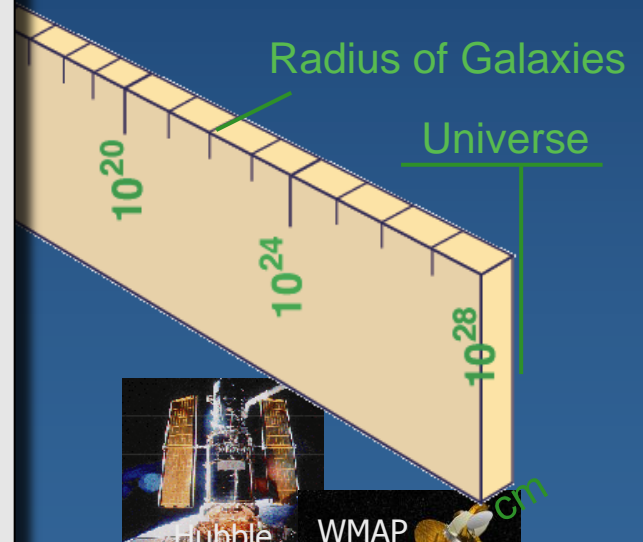


13.7 Billion Years

10^{28} cm

Today

Distance to Sun



Hubble

WMAP



VLT

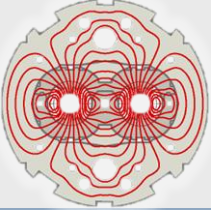


ALMA

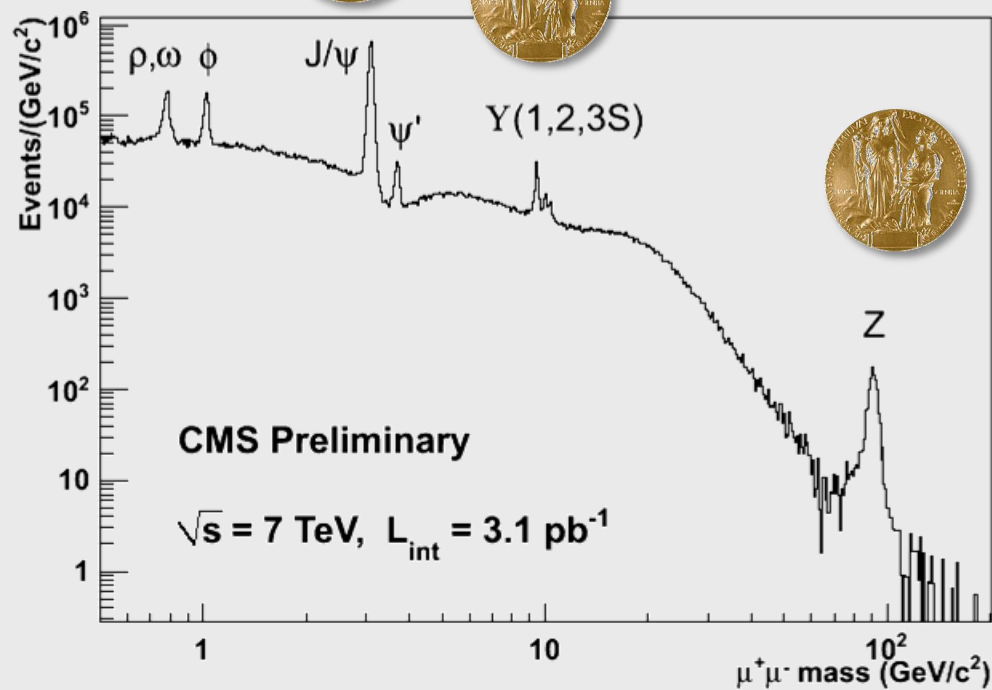
Super-Microscope



Study physics laws of first moments after Big Bang
 increasing Symbiosis between Particle Physics,
 Astrophysics and Cosmology

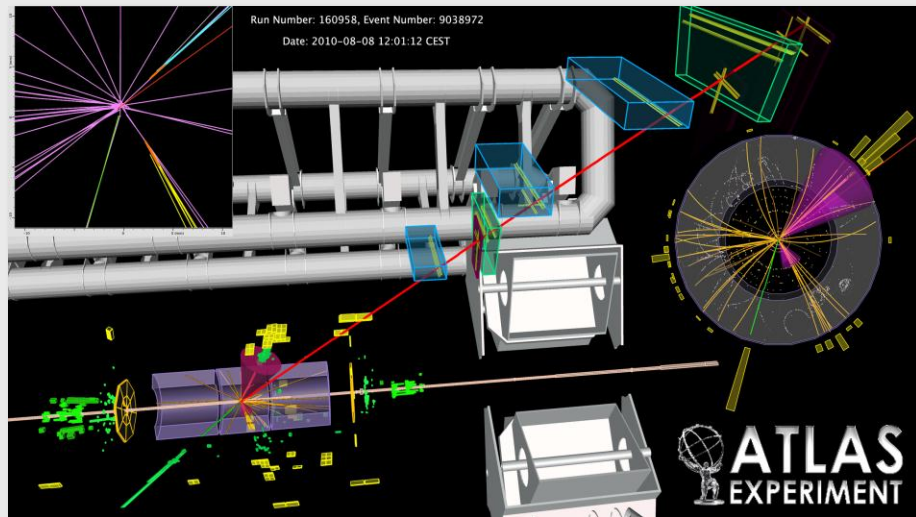


LHC Physics: First results after a few months



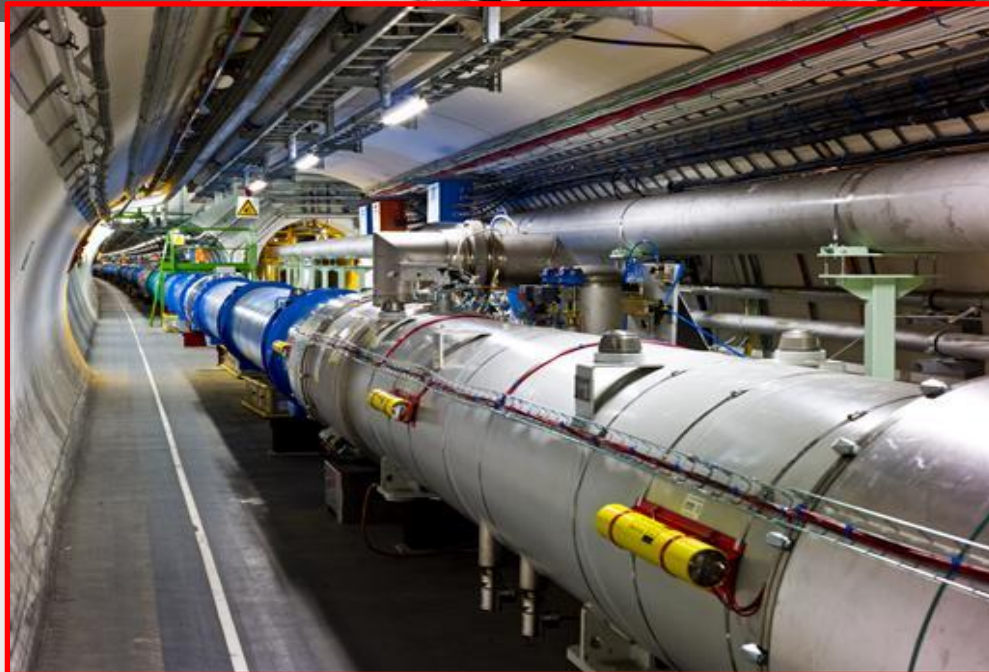
Era of top-quark physics has started:

$pp \rightarrow tt \rightarrow Wb Wb \rightarrow e \mu$ event
with 2 identified b-jets

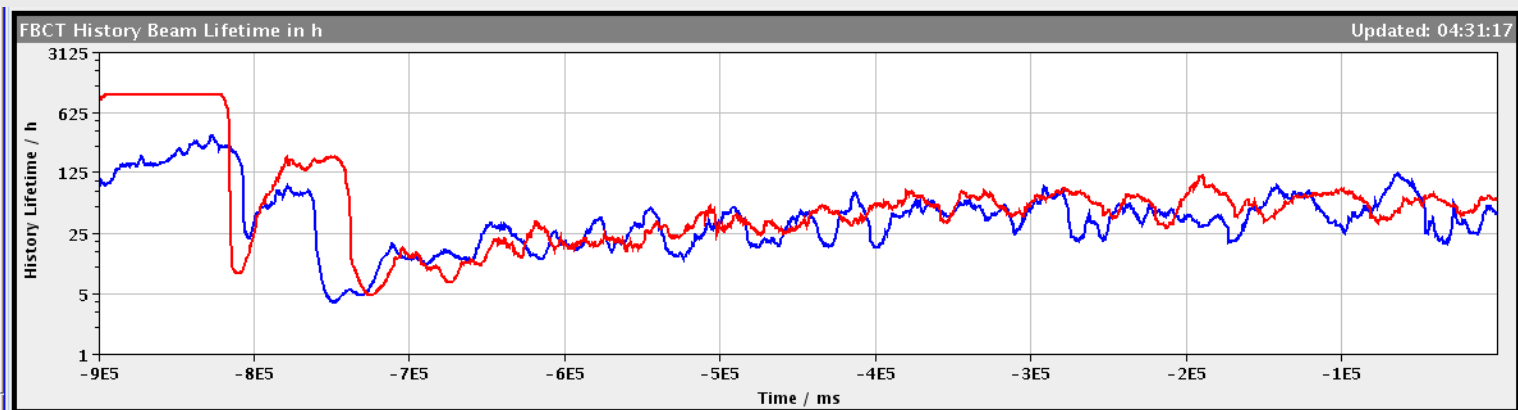
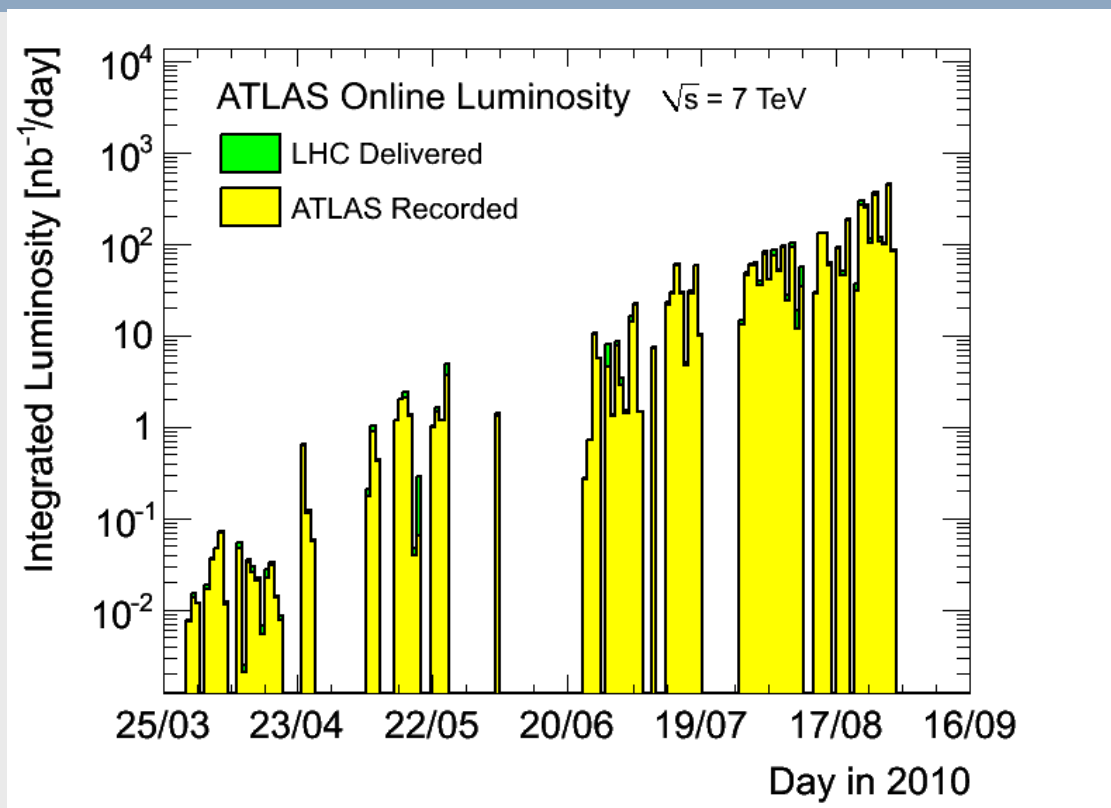


Accelerators, Detectors and Computing Grid:

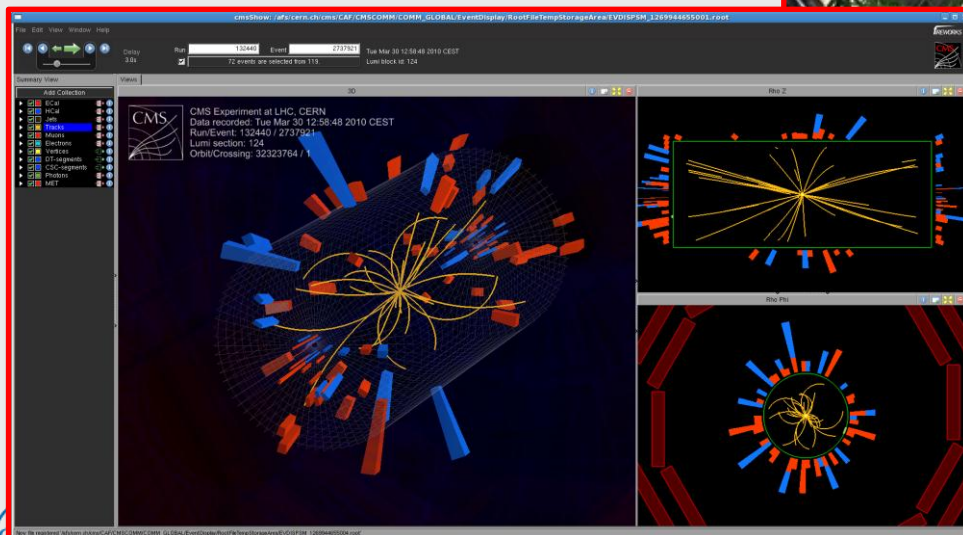
Highlights: CERN 2004-2010



Highlights: LHC Performance 2010



Highlights: CERN 2004-2010

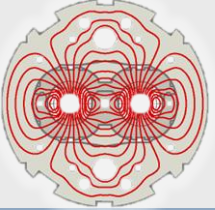


LHC experiment CMS,...

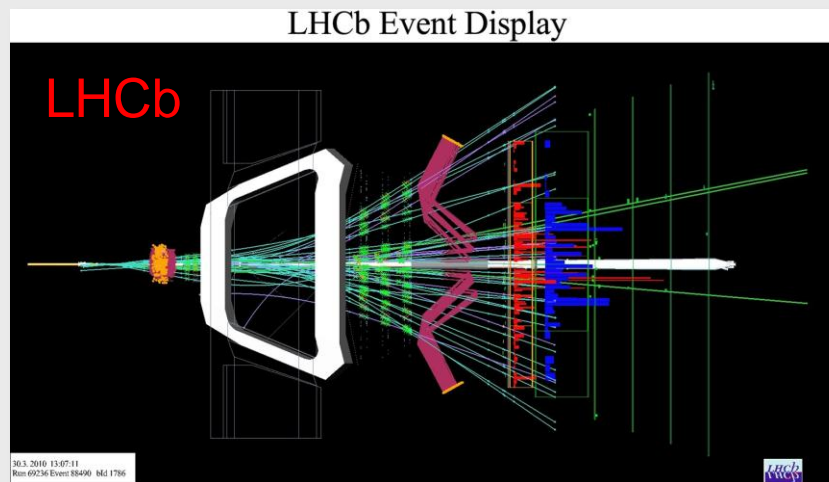
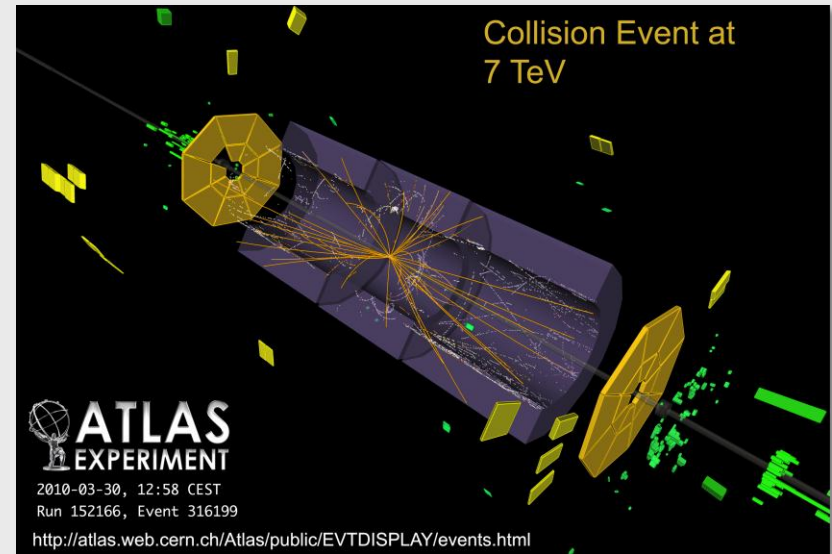
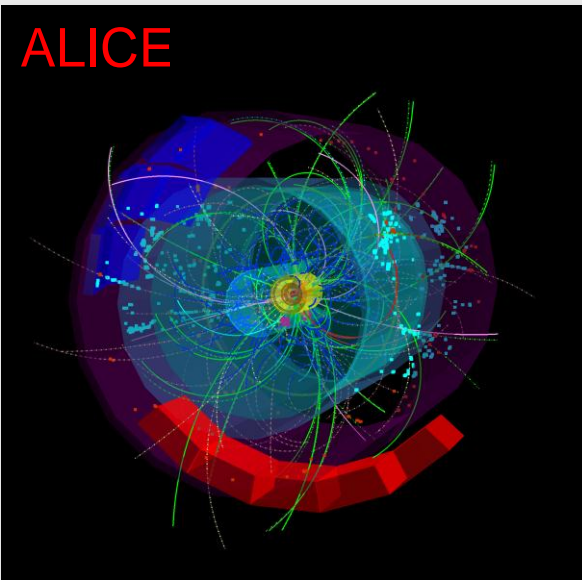
and likewise for ATLAS,
LHCb and ALICE...

September

2010



LHC: First collisions at 7 TeV on 30 March 2010

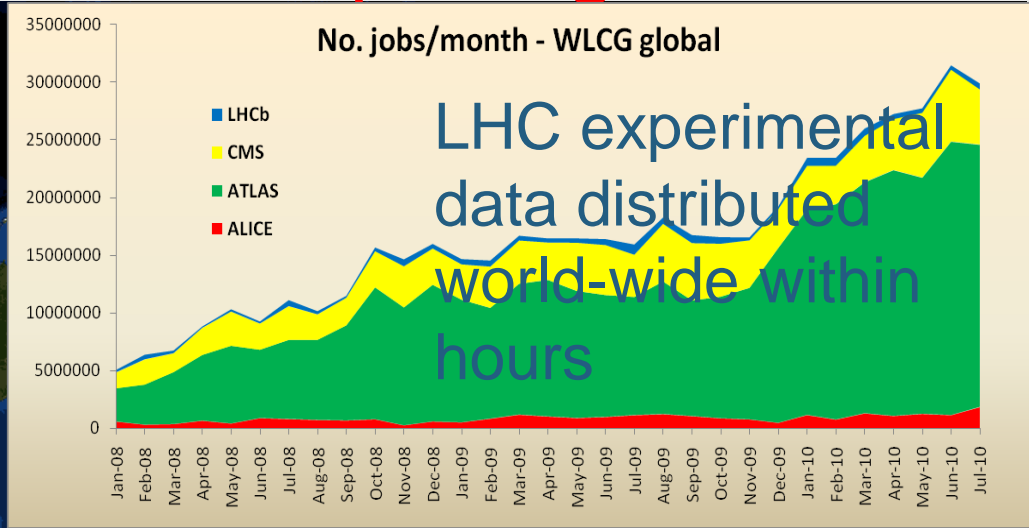


Highlights: Evolution of the computer grids

eGEE
Enabling Grids
for E-science

February 2005

- 95 sites in 21 countries
- 8,000 CPUs
- <5 PetaBytes disk
- <1000 users
- 300,000 jobs/month



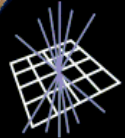
• **LCG has been the driving force for the European multi-science Grid EGEE (Enabling Grids for E-science)**

July 2010:

- >320 sites in 52 countries
- >250,000 CPU cores
- >40 PetaBytes disk, >61 PB tape
- >10,000 users
- >15 million jobs/month

21:13:50 UTC

September 2010

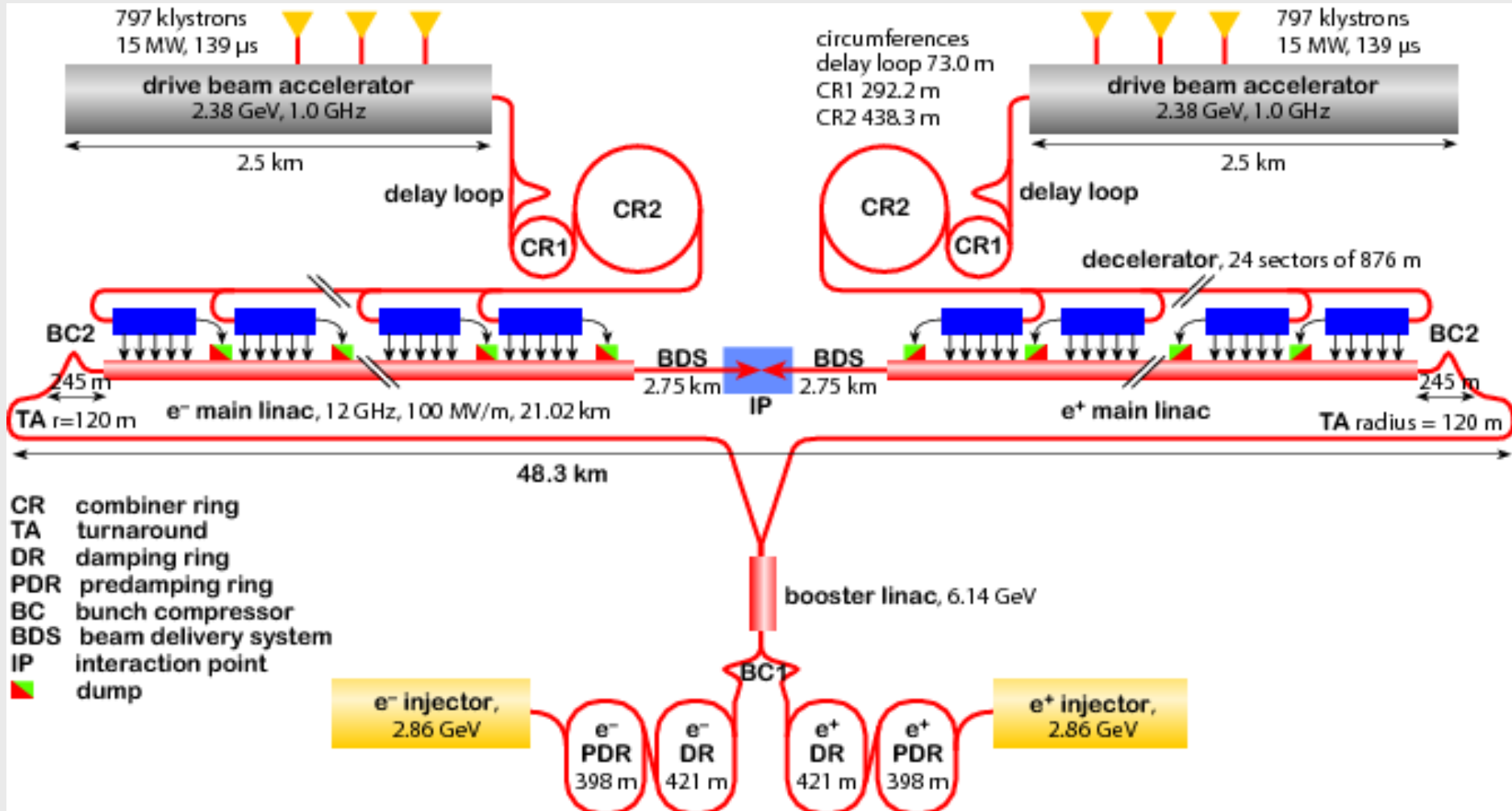


GridPP
UK Computing for Particle Physics



Highlights: the CLIC Study

3 TeV c.m. Linear Lepton Collider



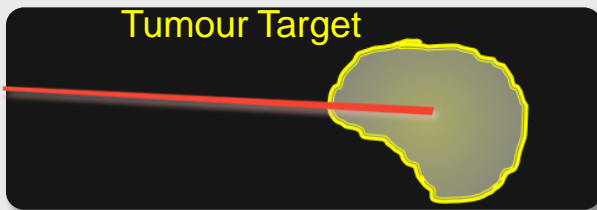
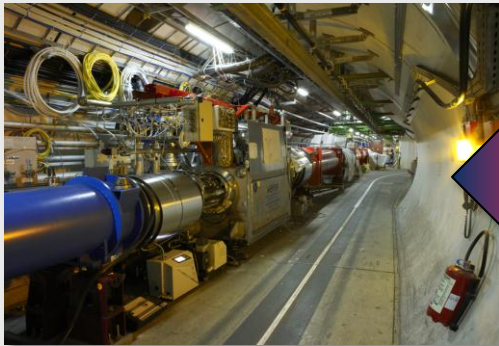


Applications of CERN Innovative Technologies

Medical imaging

Example: medical application

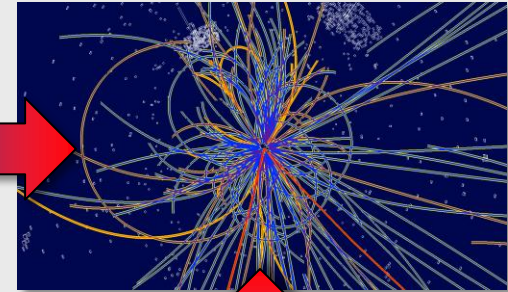
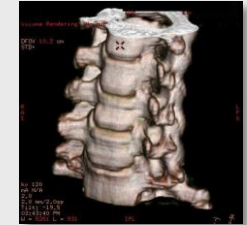
Accelerating particle beams



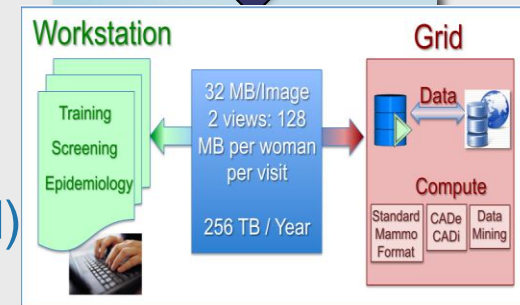
Charged hadron beam that loses energy in matter



Detecting particles



Large-scale computing (Grid)



Grid computing for medical data management and analysis





CERN Training Activities

Scientists & Engineers at CERN

Academic Training Programme



Latin American School of HEP
Viña del Mar, Chile, 2007

Young Researchers

CERN School of High Energy Physics
CERN School of Computing
CERN Accelerator School



School of Computing
2008 - Gjøvik, Norway



S&T Students

Summer Students
Programme



CERN Teacher Schools

International and National
Programmes (300 participants/year)





Jordan and CERN



The possibility of organizing training for Jordanian students at CERN has been discussed, within the framework of a planned Hashemite University master programme in nuclear physics, nuclear engineering, radiation protection and medical physics.

One Jordan student at CERN: Mr Mohamed Ebbeni, Magnet Group

CERN contact for Jordan: Prof. John Ellis

CERN contact for SESAME: Dr Jean-Pierre Koutchouk

Head of CERN International Relations: Prof. Felicitas Pauss





SESAME, Jordan and CERN



CO-OPERATION AGREEMENT

Between

THE EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH (CERN)

And

THE HASHEMITE KINGDOM OF JORDAN

And

THE SYNCHROTRON-LIGHT FOR EXPERIMENTAL SCIENCE AND APPLICATIONS IN THE MIDDLE EAST (SESAME)

Concerning

THE FURTHER DEVELOPMENT OF SCIENTIFIC AND TECHNICAL CO-OPERATION IN ELEMENTARY PARTICLE PHYSICS, ACCELERATOR AND INFORMATION TECHNOLOGY AND SYNCHROTRON RADIATION PHYSICS

After discussions initiated at the end of 2009 at CERN by Prof. Hoorani, a meeting with Dr Nadji in Paris (SOLEIL) in March 2010, a technical meeting was organized at CERN on July 27th between Prof. Hoorani, Dr Nadji and 11 CERN experts to define the details of the cooperation programme.

Four addenda are ready to be attached to the first Protocol to this Co-operation Agreement. Others are in preparation.

Areas of collaboration/support:

1. Magnet Design Support and Review
2. Magnetic Measurements
3. Personnel protection and Safety
4. Shielding calculations with FLUKA

5. Radiation detectors
6. Access to some CERN IT resources
7. Support for training
8. Support from the CERN EU Office

Another CERN action in support of SESAME is being investigated.

An aerial photograph of a rural landscape, likely in a developing country, showing a dense grid of small, rectangular agricultural plots in various shades of brown and green. A large, thin white circle is drawn over the center of the image, framing the text. In the bottom right corner, a portion of an airport runway and taxiway is visible.

Thank You!

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