FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

ILO for PORTUGAL @

29th JANUARY 2010

EMIR KADIR SIRAGE

Portugal & CERN – Past, Present and Future: ILO Perspective

Organizers:

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

OUTLINE

1. Outlook about CERN
2. ILO mandate
3. Past-Present, PT industry
   - Overview procurement Policy
   - Procurement success cases of PT companies
   - Available Stats – Industrial Return Coefficient
4. Future:
   - Foreseen ILO actions for 2010
     - New projects at CERN
   - TT @ CERN


CERN, a European Intergovernmental Research Organisation
founded in 1954 – now 20 Member States
Research & Discovery
Technology
Training
Collaborating

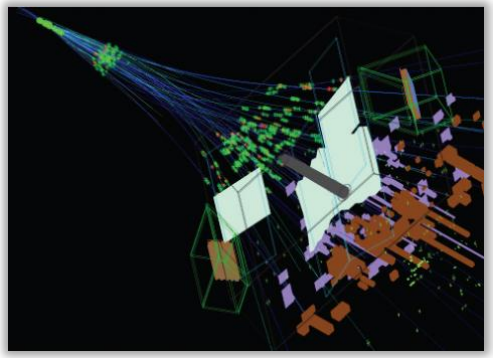
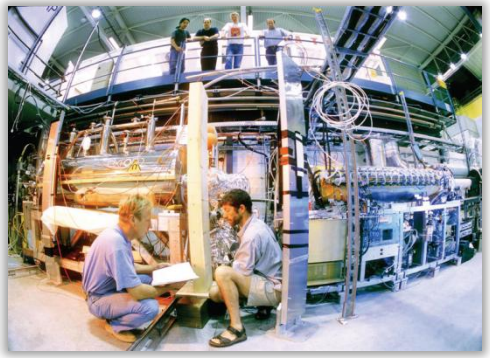
CERN´s missions

Seeking answers to questions about the Universe.
What is it made of?
How did it come to be the way it is?

Advancing the frontiers of technology and engineering.

Uniting nations together through science. Today 9000 visiting scientists from more than 80 countries.

Training young scientists and engineers who will be the experts of tomorrow.


CERN in a nutshell

- Founded in 1954, one of Europe's first joint ventures and has today 20 Member States and observer states (incl. US & Japan).
- World's largest particle physics laboratory.
- Provides scientists from all around the world with tools to study the building blocks of matter and the forces that hold them together.
  - This is done with huge particle accelerators and detectors based on cutting edge technologies.
- Annual budget: > 650M€

- 2400 staff*
- 584 Fellows and Associates
- 9140 visiting scientists*

*According to recent repots

- **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.
- **Observers to Council:** India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and Unesco

20 MS Contributions

Amounts in Swiss francs

Germany	19.90%	218'583'400	Norway	2.53%	27'820'050
France	15.36%	168'725'200	Austria	2.24%	24'661'250
United Kingdom	14.70%	161'587'150	Greece	1.86%	20'473'300
Italy	11.52%	126'543'500	Denmark	1.76%	19'390'050
Spain	8.53%	93'725'550	Finland	1.55%	16'991'800
Netherlands	4.80%	52'714'750	Czech Republic	1.16%	12'690'200
Switzerland	3.01%	33'085'700	Portugal	1.14 %	12'484'500
Poland	2.86%	31'376'350	Hungary	0.78%	8'572'300
Belgium	2.77%	30'445'800	Slovak Republic	0.54%	5'913'650
Sweden	2.77%	30'376'450	Bulgaria	0.22%	2'406'300

Total	**100%**	**1'098'567'250 CHF**

ORGANIGRAM

Director-General
Rolf-Dieter HEUER

Council Secretariat
(B. van den Stichelen)
EU Projects Office (S. Stavrev)
Legal Service (E.-M. Gröniger-Voss)
Translation & Minutes (J. Pym)

Directorate's Office
I. Bejar-Alonso
E. Rondio
E. Tsesmelis

External Relations (F. Pauss)
Communication (J. Gillies)
Host States Relations (F. Eder)
Internal Audit (L. Esteveny)
Knowledge & Technology Transfer (C. Parrinello)
Safety Commission (R. Trant)
VIP Office (W. Korda)

Sectors

Director for Administration & General Infrastructure
Sigurd Lettow
Resources Planning & Control

Director for Research & Scientific Computing
Sergio Bertolucci
Review of Research Collaboration

Director for Accelerators & Technology
Steve Myers
Projects Office

Departments

Finance & Procurement (FP)
T. Lagrange
Deputy: C. Saitta

General Infrastructure Services (GS)
T. Pettersson
Deputy: M. Tiirakari

Human Resources (HR)
A.-S. Catherin
Deputy: J.-M. Saint-Viteux

Information Technology (IT)
F. Hemmer
Deputy: D. Foster

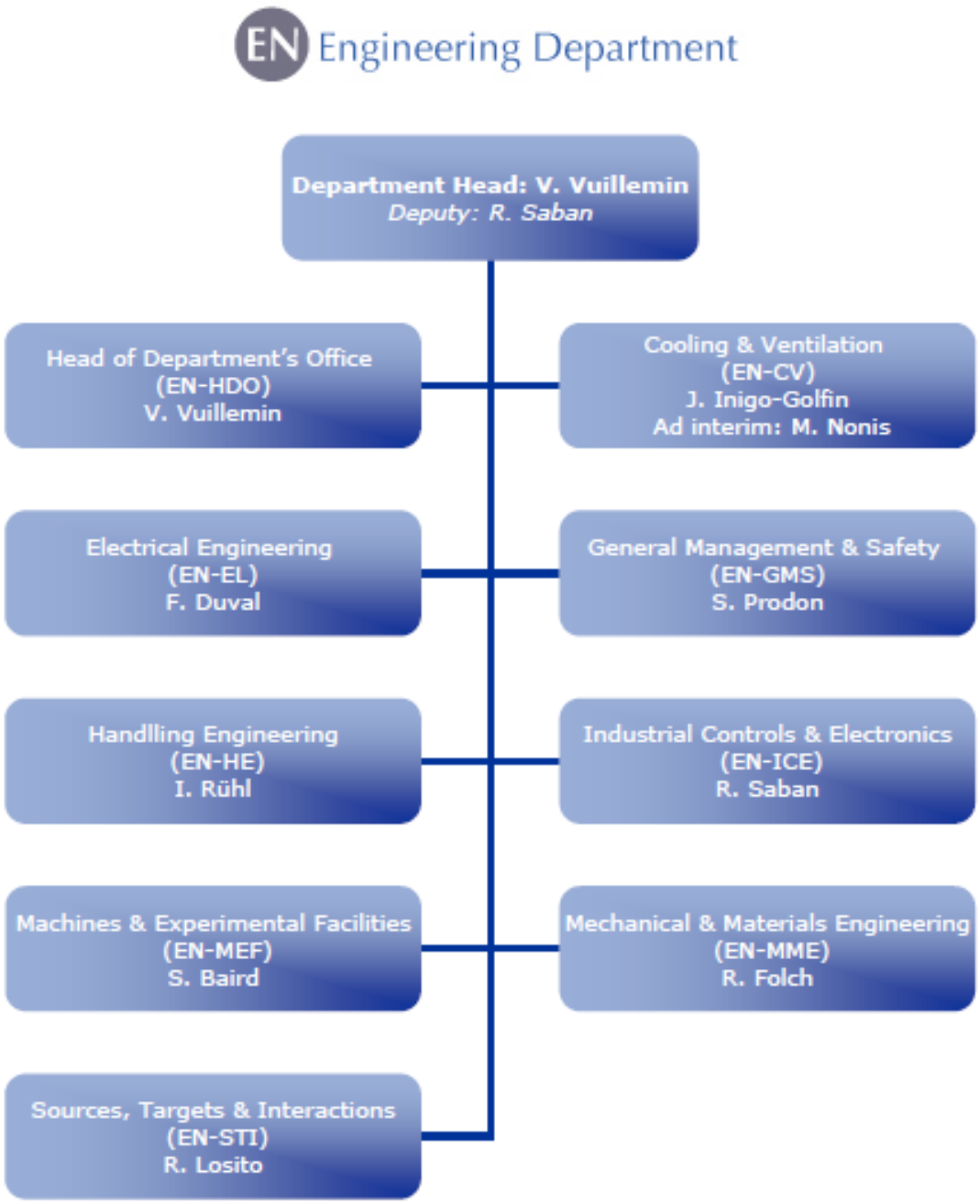
Physics (PH)
P. Bloch
Deputies: A. Gonidec, L. Alvarez-Gaume

Beams (BE)
P. Collier
Deputy: O. Bruning

Engineering (EN)
V. Vuillemin
Deputy: R. Saban

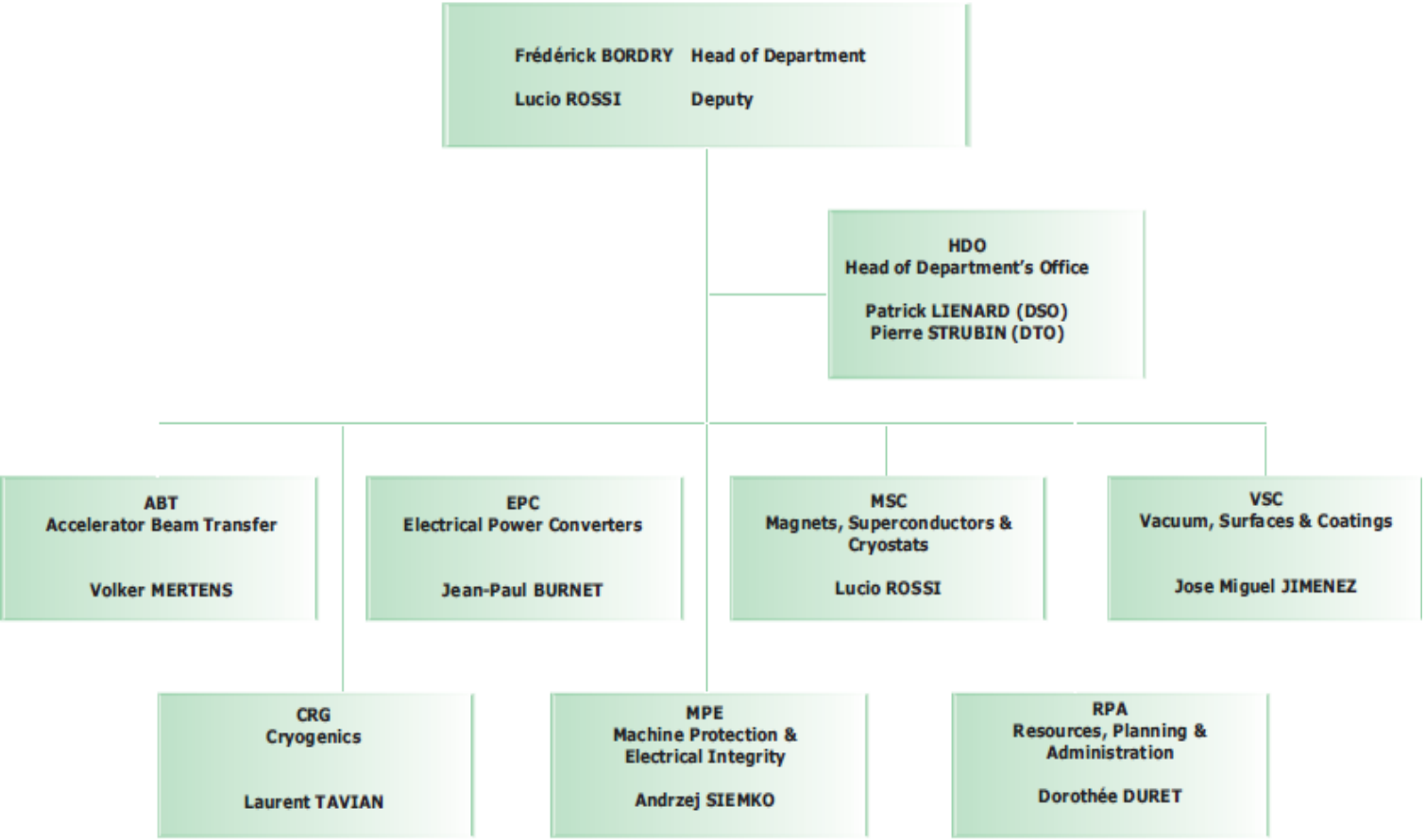
Technology (TE)
F. Bordry
Deputy: L. Rossi

Networking in key departments



Networking in key departments

TECHNOLOGY DEPARTMENT



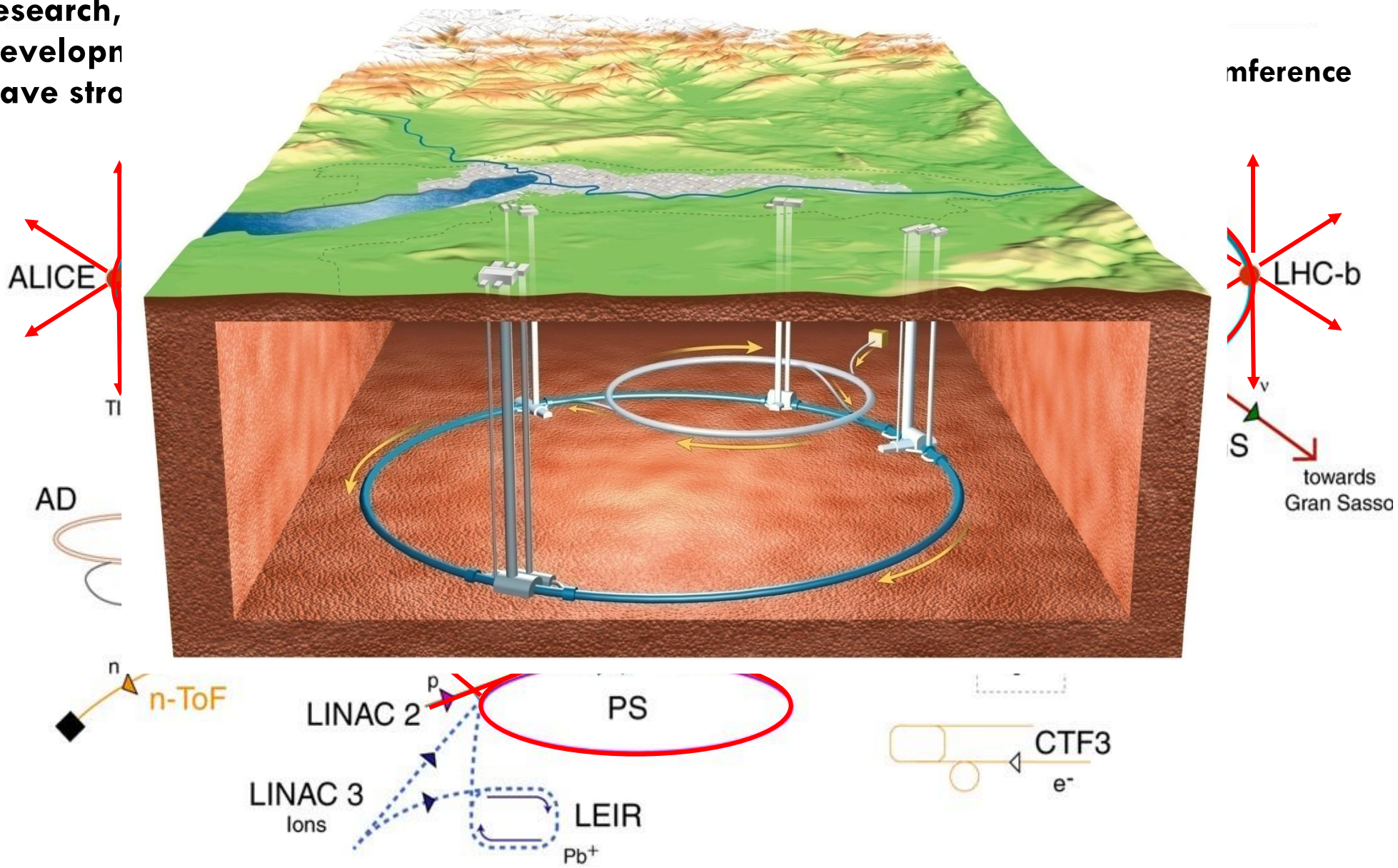
IT Department strucuture

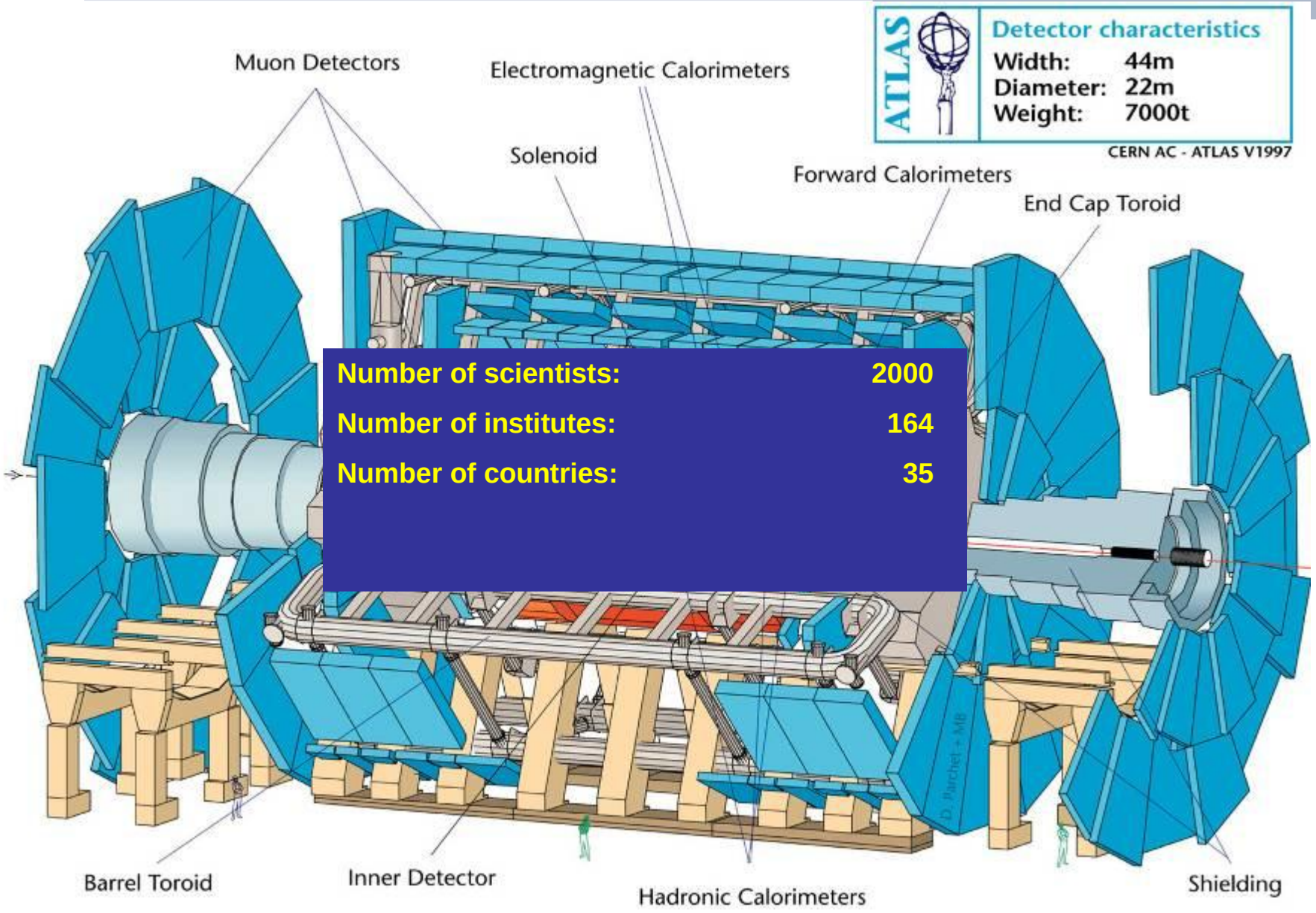
- G. Leader (Computing facilities)
- Communication systems
- Database services
- Data storage Services
- Experiment support
- Operating systems & Information services
- Platform & Engineering services
- User and Document services;

ACCELERATOR COMPLEX

- **For the purpose of fundamental research, developn have stro**

mference

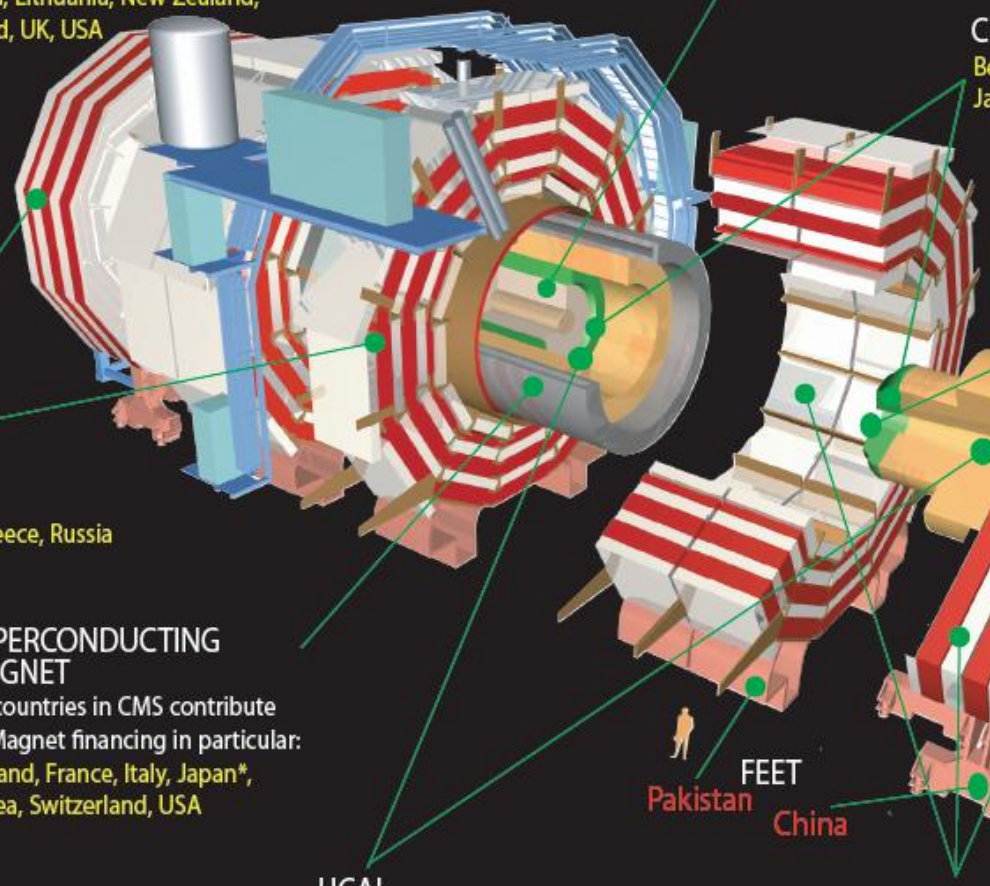




Number of scientists:	**2000**
Number of institutes:	**164**
Number of countries:	**35**

38 Countries, 183 Institutes, 3000 scientists and engineers (including 400 students)

June 2008



TRIGGER, DATA ACQUISITION & OFFLINE COMPUTING
Austria, Brazil, CERN, Finland, France, Greece, Hungary, Ireland, Italy, Korea, Lithuania, New Zealand, Poland, Portugal, Switzerland, UK, USA

TRACKER
Austria, Belgium, CERN, Finland, France, Germany, Italy, Japan*, Mexico, New Zealand, Switzerland, UK, USA

CRYSTAL ECAL
Belarus, CERN, China, Croatia, Cyprus, France, Italy, Japan*, Portugal, Russia, Serbia, Switzerland, UK, USA

PRESHOWER
Armenia, CERN, Greece, India, Russia, Taiwan

RETURN YOKE
Barrel: Estonia, Germany, Greece, Russia
Endcap: Japan*, USA

SUPERCONDUCTING MAGNET
All countries in CMS contribute to Magnet financing in particular: Finland, France, Italy, Japan*, Korea, Switzerland, USA

FEET
Pakistan
China

FORWARD CALORIMETER
Hungary, Iran, Russia, Turkey, USA

HCAL
Barrel: Bulgaria, India, Spain*, USA
Endcap: Belarus, Bulgaria, Georgia, Russia, Ukraine, Uzbekistan
HO: India

MUON CHAMBERS
Barrel: Austria, Bulgaria, CERN, China, Germany, Hungary, Italy, Spain,
Endcap: Belarus, Bulgaria, China, Colombia, Korea, Pakistan, Russia, USA

Total weight	: 12500 T
Overall diameter	: 15.0 m
Overall length	: 21.5 m
Magnetic field	: 4 Tesla

* Only through industrial contracts

Planning for real HEP

Mike's cunning plan

Energy	Safe	Very Safe
450	1 e12	1 e11
1 TeV	2.5 e11	2.5 e10
3.5 TeV	3.0 e10	probe

Beam commissioning strategy

Global machine checkout

Essential 450 GeV commissioning ↔ Trial ramps

Machine protection commissioning 1

Experiments' magnets at 450 GeV

450 GeV collisions

Ramp commissioning to 1.2 TeV

Xmas

All has been accomplished! +

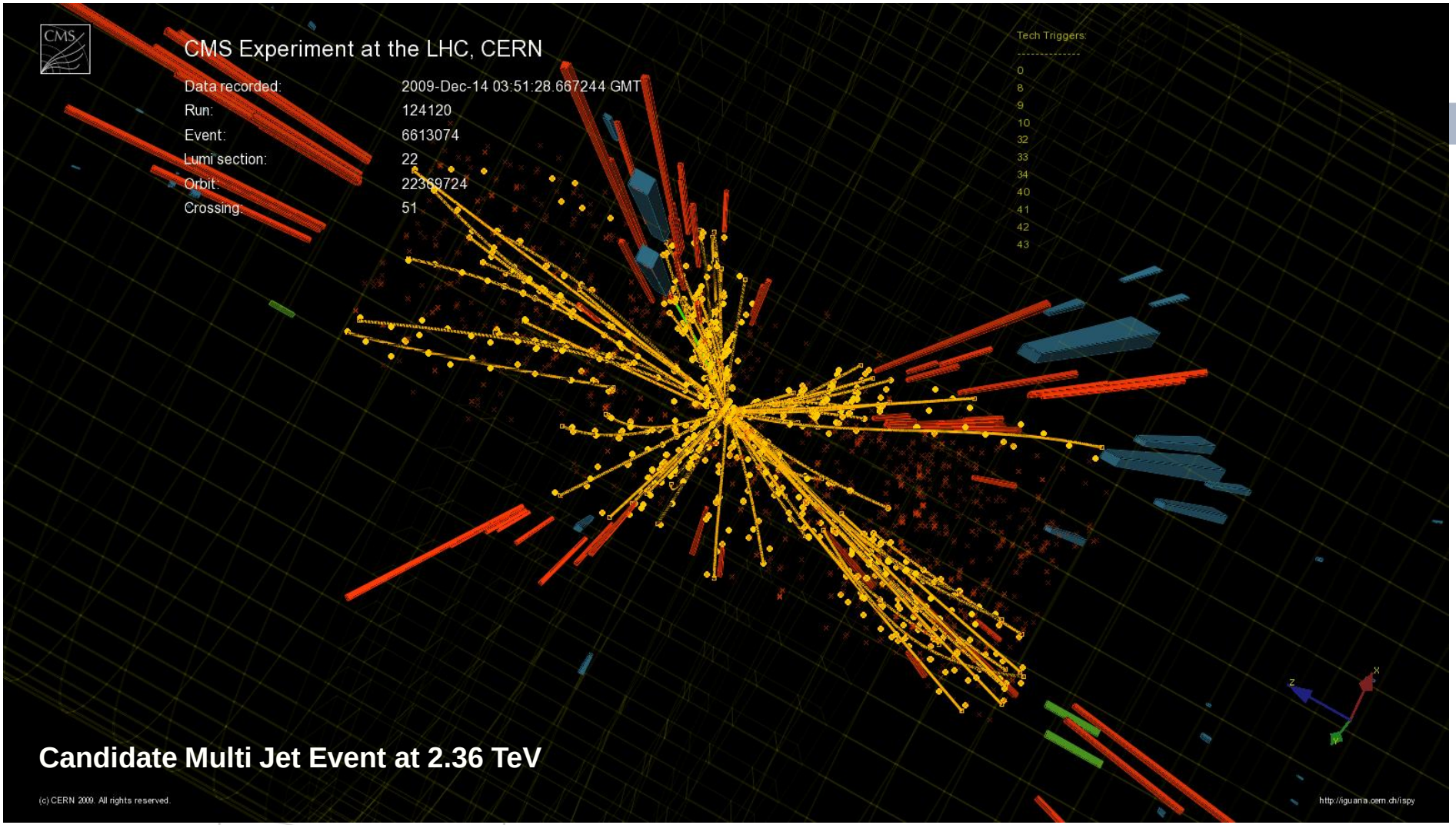
System/beam commissioning | Machine protection commissioning 2

2010

3.5 TeV beam & first collisions

Full machine protection qualification

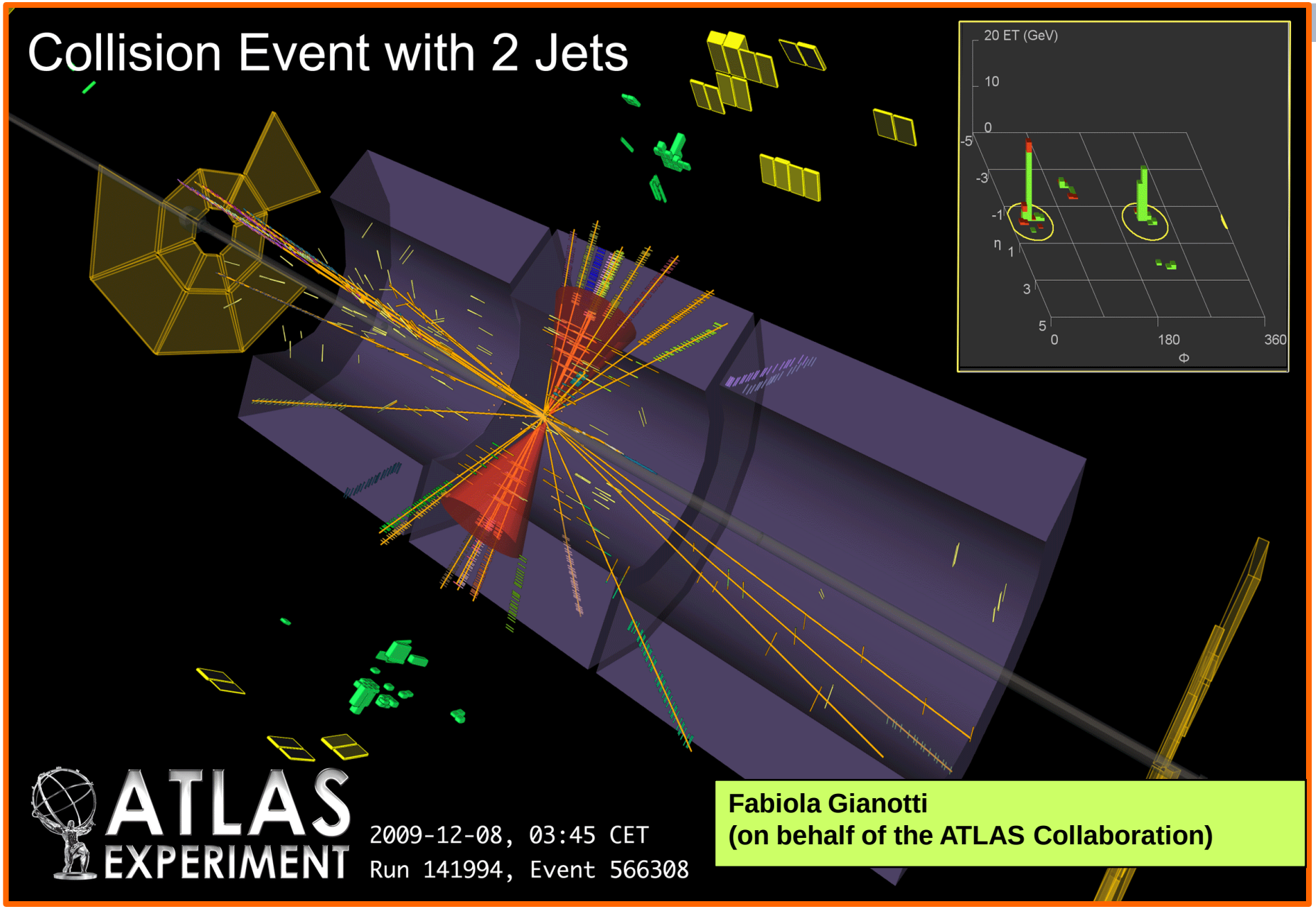
System/beam commissioning | Pilot physics



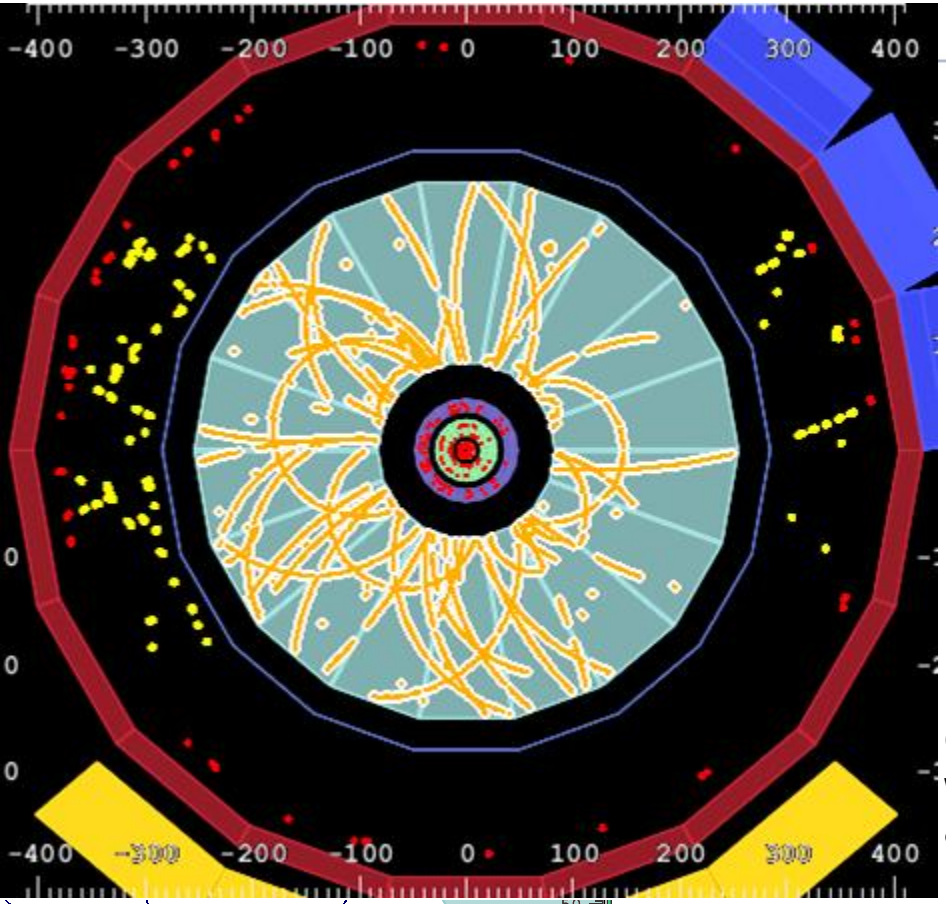
2nd LHC Status Report
CERN 18 Dec'09

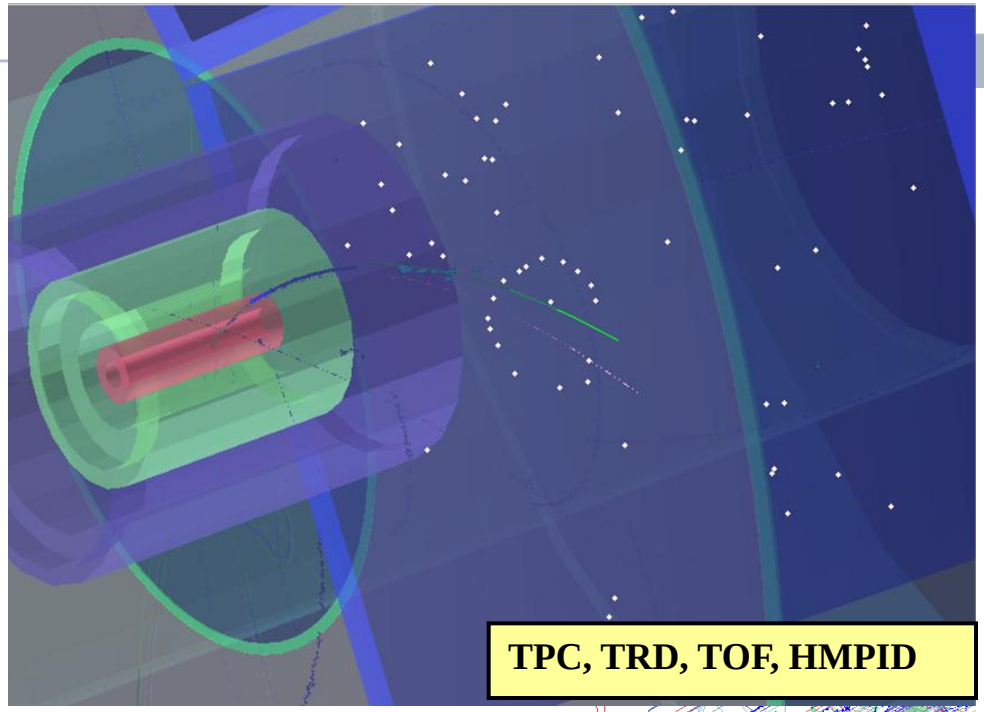
T. Virdee
On Behalf of the CMS Collaboration

ATLAS through first data



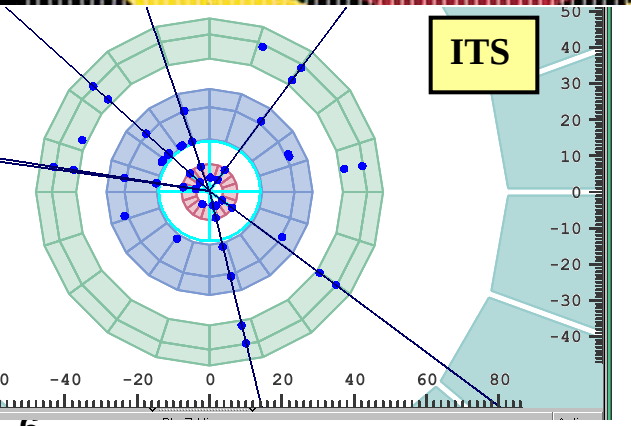
Fabiola Gianotti
(on behalf of the ATLAS Collaboration)



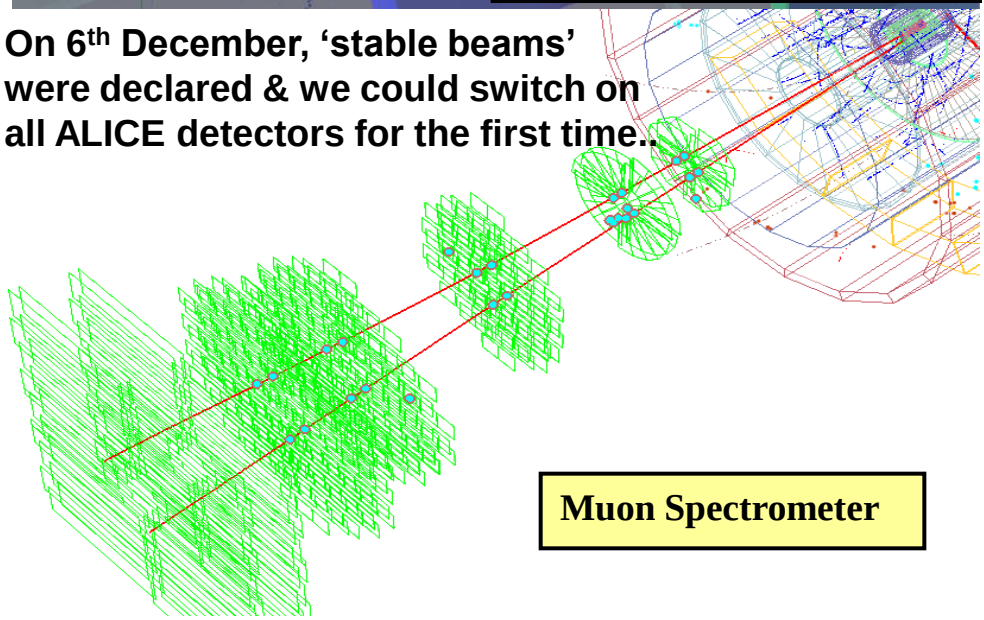


TPC, TRD, TOF, HMPID

On 6th December, 'stable beams' were declared & we could switch on all ALICE detectors for the first time..



ITS

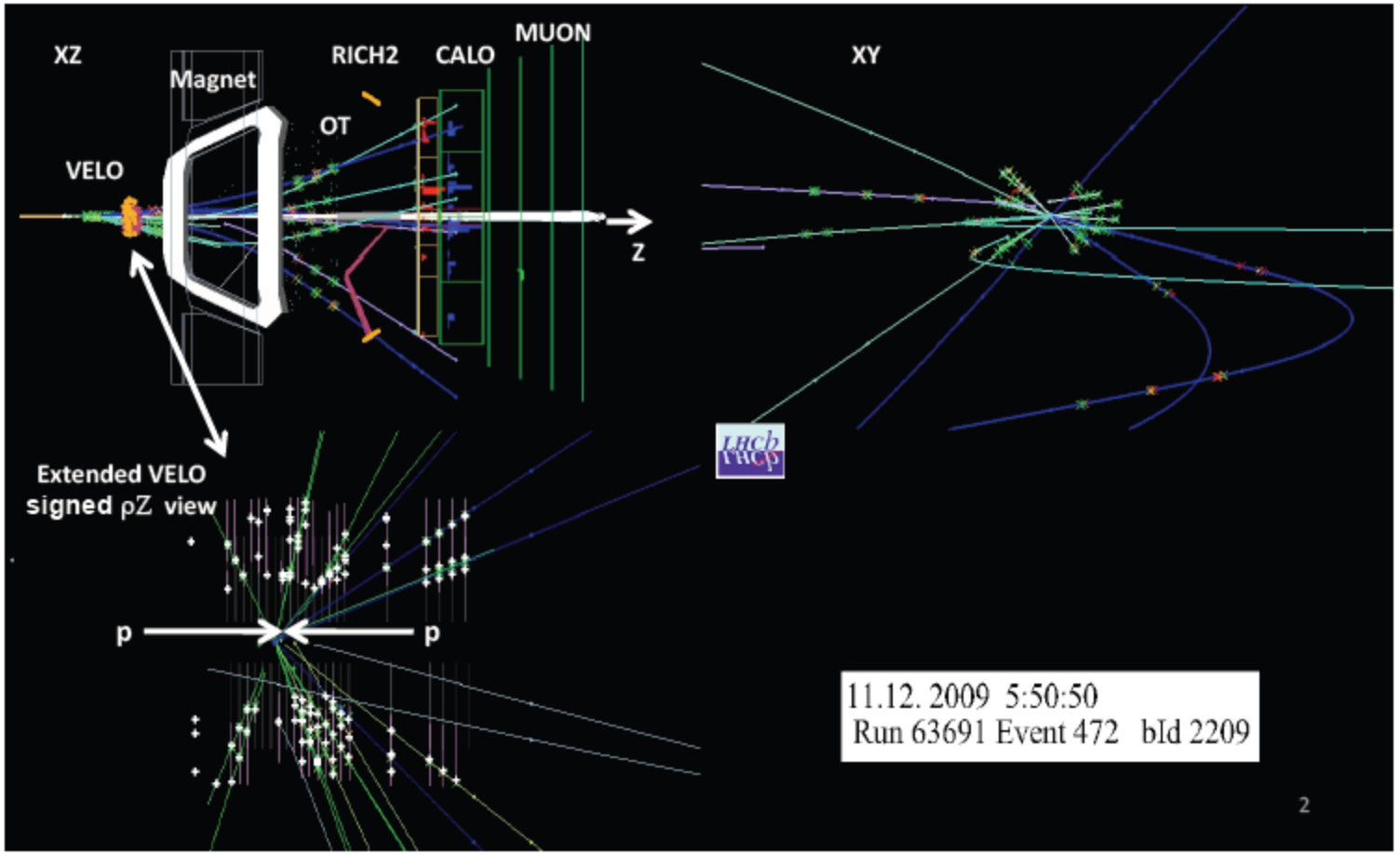


Muon Spectrometer

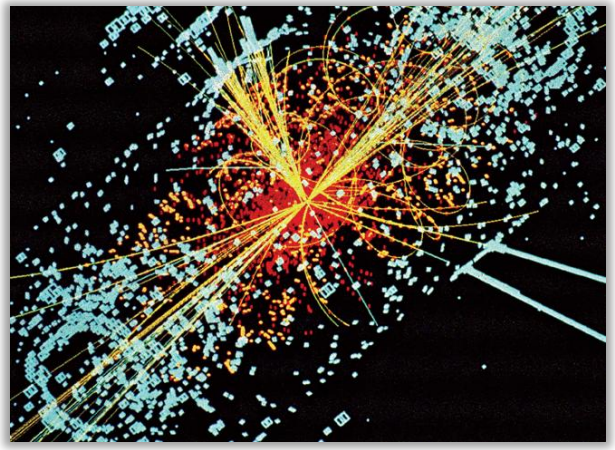
6

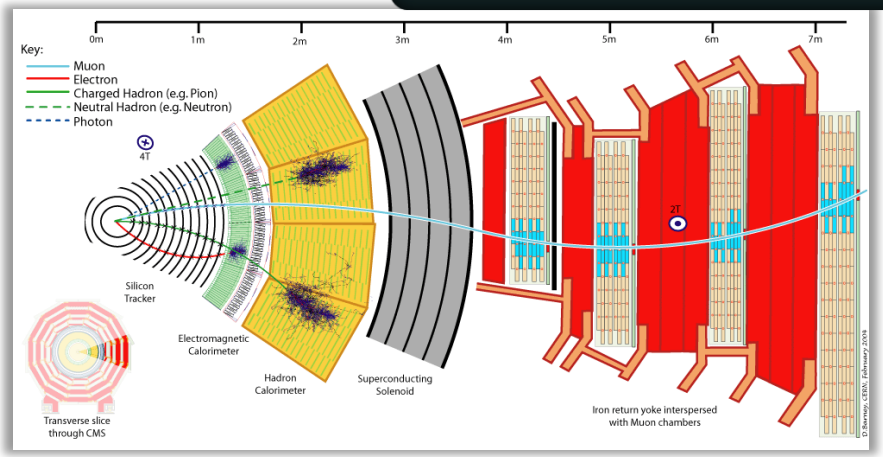
A few highlights from LHCb

thanks to the outstanding start-up LHC performance



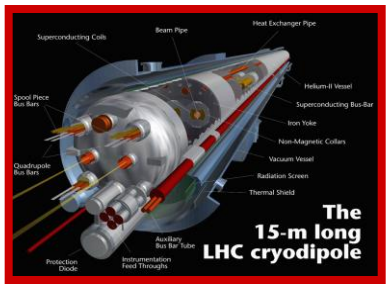
DATA FROM LHC DETECTORS





- LHC: 1 billion proton-proton collisions per second
- Detector: 100 million channels, each 40 million measurements per second
- Initial data rate equivalent to 50 billion phone calls at the same time, or 100’000 CD’s / sec.
- Detector trigger system chooses (in <0.1 seconds) 100 best collision events of the 1 billion for recording.
- Computing GRID is essential for the extraction of science from the LHC.

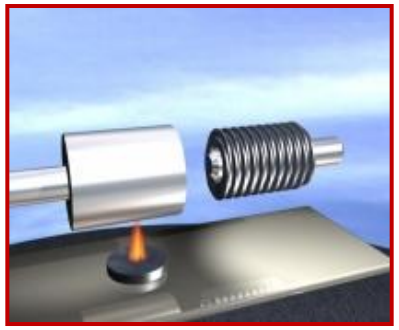
DOMAINS OF TECHNOLOGIES

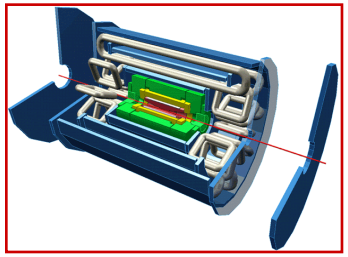


Technology Transfer

Accelerators, Magnet & Cryogenics

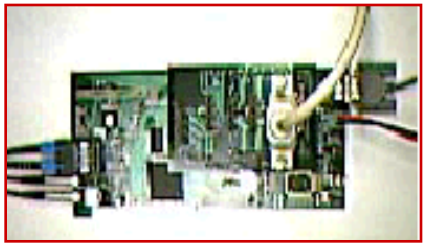
Mechanical Engineering

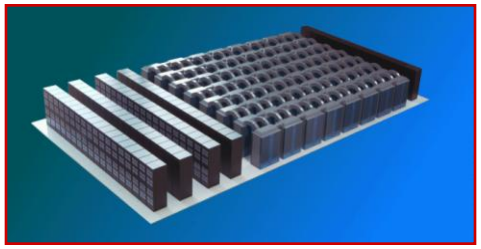




Detectors & Instrumentation

Electronics





Information Technologies

Materials Science

ILO MANDATE

Identify tenders that can be relevant for PT companies and contact these companies

Give support to the companies which want to receive na invitation to tender

Keep an active network with the technical department and the PT staff at the organizations to get PT companies involved in the requirement specification process in forthcoming projects

Attend to PT technology and trade shows to promote the organizations as a potential buyers of products and services

ILO

TTO

Identify technologies developed at the organizations which can be interesting for PT companies

Carry through marked researches at PT national market on these technologies and contact the relevant companies

Attempt to get PT companies, very targeted research units within –(Universities & Labs) **into relevant pre-competitive R&D collaborations** at the organizations

Attend to the relevant PT technology and trade shows to "try" to promote some of the commerciable technologies from the portfolio of the organizations

OVERVIEW PROCUREMENT POLICY

- In the interest of the organization the general procurement policy shall have the following goals:
  - At least **three competitive bids shall be sought for any purchase exceeding 5000 CHF ;**
  - In principle, invitations to tender **shall be limited** to firms established **in the CERN Member States;**
  - **Ensure** that bids fulfill all the technical, financial and delivery requirements;
  - **keep overall costs for CERN as low as possible** and **achieve well balanced industrial return coefficients for all Member States.**

OVERVIEW PROCUREMENT POLICY

- **CERN projects require use of new technologies** in many fields (e.g. **magnets, vacuum, cryogenics, electronics, mechanical structures, computing, telecommunication,** etc.).
- New developments are often needed due lack of ready technical solutions. **Partnering with other research laboratories, universities and industry is essential.**
- However, there are also many requirements for "off-the-shelf" products which are readily available in industry in order to reduce overall costs as much as possible for CERN.
- **Whether requirements are "hi-tech" or "off-the-shelf" partnering with industry is essential.**
- In most cases, partnerships with industry are the result of procurement actions by CERN.

RANK 1: TENDERING PROCESS

Past Present – Success cases from PT industry

Metallurgy

A.SILVA MATOS

FOR THE LHC AND ATLAS

The ATLAS detector includes two independent systems requiring cryogenic technologies: the superconductive magnet and the liquid argon calorimeter. The total cold mass of the magnet approaches 600 tonnes. The argon calorimeter contains three low-temperature liquid argon vessels with a total volume of 85 m³. Liquid nitrogen is used to cool down the calorimeter and is also used for the permanent cooling of the filled cryostats. LHC cryogenics will need 40 000 leak-tight pipe junctions, 12 million litres of liquid nitrogen will be vaporized during the initial cool down of 31 000 tonnes of material and the total inventory of liquid helium will be 700 000 litres. Superfluid helium will be used allowing kilowatts of refrigeration to be transported over more than a kilometre with a temperature drop of less than 0.1 K. The cryogenic installations are composed of different pieces of equipment to feed two LHC sectors with 4.5 K helium and superfluid helium at 1.9 K.

APPLICATIONS

A. SILVA MATOS METALOMECÂNICA S.A. constructed and installed for CERN 36 pressure vessels. These carbon steel vessels with a capacity of 250 m³ each and 20 bar working pressure were destined for the storage of gaseous helium, 30 of them for the cryogenic system of the LHC and 6 for the ATLAS project. As a consequence of this important supply to CERN, the Company greatly improved its capacity for the manufacture of cryogenic vessels, which are now being used for the LNG project.

THE COMPANY

A. SILVA MATOS METALOMECÂNICA S.A. was founded in 1980 to supply services for the food industry. Since then the Company has diversified to supply tanks for liquid combustibles, auto-gas storage and invested in the tooling and machinery to produce large dimension cryogenic-liquid tanks. Tubular heat exchangers as well as reactors, condensers and vaporizers are also amongst the products offered. Recently, wind generator towers for aeolian energy have been added to the available products. The Company has a reputation for high-quality products and high-quality control standards.

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Electricity (Transformers, power converters), electronics, ENS – SCATEX)

efacec

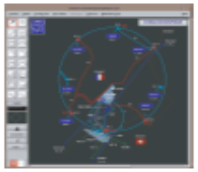
Since the construction of LEP in the 1980s, EFACEC has produced several types of electronic equipment for CERN, including the electronic modules and chassis for the SPS RENOVATION and MINIDISCAP programmes. More recently besides its standard solution for the power network management systems, the Company developed specific features for CERN, namely the Gateway to External Systems (GATE X) and Front-end interfaces to existing RTUs and other devices. This experience was very important to EFACEC, since it projected the company in the SCADA / DMS area and new functionalities were added to the core solution.

APPLICATIONS

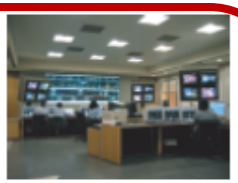
Today's fast changing world is pushing power distribution utilities to new challenges, where improving the efficiency of power system operation is one of the key issues. SCATE X improves network operation, analysis and planning. The system was designed according to the state-of-the-art and relies on the large experience of EFACEC in this field. The result from the development carried out for CERN is an advanced system where traditional SCADA functions are complemented by a set of distribution-network-oriented functions (DMS), namely network colouring, topology processing, power applications such as power flow, short circuit analysis, state estimation, as well as load forecasting, fault detection, etc. that have been integrated in the core products of the Company as shown below.

THE COMPANY

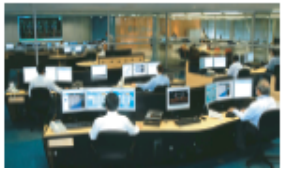
EFACEC Sistemas de Electrónica, S.A. is an EFACEC Group Company, devoted to Electronics and Information Technologies. Created in the 1940s the EFACEC Group is the biggest Portuguese industrial group in the domain of electricity and electronics, developing its activity in the areas of energy, transport, telecommunications, industry and buildings, service and maintenance, logistics and environment.



SCATE X: editing the geographical map (detail)



Control centre based on the SCATE X (Metro Do Porto, Porto, Portugal)



EFACEC Sistemas de Electrónica, S.A.

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RANK 1: TENDERING PROCESS

Past Present – PT Companies that supplied CERN

Quality inspections services (superconducting cables, magnets, pressure vessels, etc)

Since 2000 ISQ and CERN have developed a complete set of quality inspection methodologies and quality assurance processes to be applied in the equipment construction of large scientific facilities at CERN and manufacturing of LHC superconducting cables, magnets, cryogenic components and cryostats. These methodologies have been used in a multiplicity of services provided by more than 20 ISQ engineers working for the needs of the LHC in nine different countries and many others. These services are aiming to improve the quality and safety in the operation of this equipment and components, leading to optimized construction costs and accomplishment with technical specifications.

APPLICATIONS

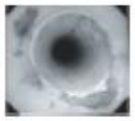
The benchmarking and adaptation of quality and safety inspections methodologies and procedures for the LHC equipment, resulted in the acquisition of a very special know-how and specific expertise in the areas of quality and safety of cryogenics. This has allowed the application by ISQ of the know-how acquired working with CERN in the ALMA project, being developed by ESO (European Southern Observatory) in Germany, and the GTM (Grande Telescope Milimetro) at the Guyana Space Centre of ESA.

THE COMPANY

ISQ is a non profit and independent organization founded in 1965, providing services on construction, supervision and inspection, maintenance inspection, testing, non-destructive testing, metrology, etc. With around 800 employees worldwide, ISQ operates in more than 20 countries.

Computer form of the inspection

Welding inspection of a cryo-magnetic



Internal video inspection of virtual pipes

ISQ – Instituto de Soldadura e Qualidade
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Portugal
Tel: + 351 214228115
Fax: + 351 214228125
E-Mail: info@isq.pt
http://www.isq.pt

Mechanical components

TO LIFT CONCRETE BLOCKS

Hydraulic scissor lift table designed specially to lift a 10-tonne concrete block used to shield radiations. The main demand was the need to reach reliable positioning by an indeterminate time onto the upper position. For security reasons the concrete block must be in the upper position when no laboratory tests are being made. To fulfil this demand, an electromechanical system was studied and designed that, in conjunction with the hydraulic system, can guarantee these conditions.

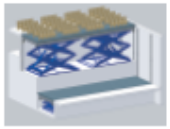
APPLICATIONS

New products of ACL now use some of the technology developed for this table lift. The part of technology used is the system to hold the table in the upper position, locked for long periods and without oil leakage.
Fields of application:
- Theatre lift stages,
- Big lift platforms in industry,
- Overcoming architectural barriers in buildings: small lift tables that must use the same locking device.

THE COMPANY

ACL – Alfredo Cardoso & Cª Lda is Portugal's major manufacturer of lift equipment. This leading position was gained as a result of a concerted effort in research and constant development in hydraulic oil solutions. Fifty years of experience in light-duty metal mechanics and hydraulics and constant investment in human resources coupled with state-of-the-art solutions in production and assembly development have enabled the Company to supply innovative solutions tailored to customers' needs and requirements. The application of ACL equipment is diverse, ranging from basic vertical lifting of loads to theatre stages and onto overcoming architectural barriers in buildings.

Table installed in CERN



New product using technology developed on the CERN table lift

ACL – Alfredo Cardoso & Cª Lda
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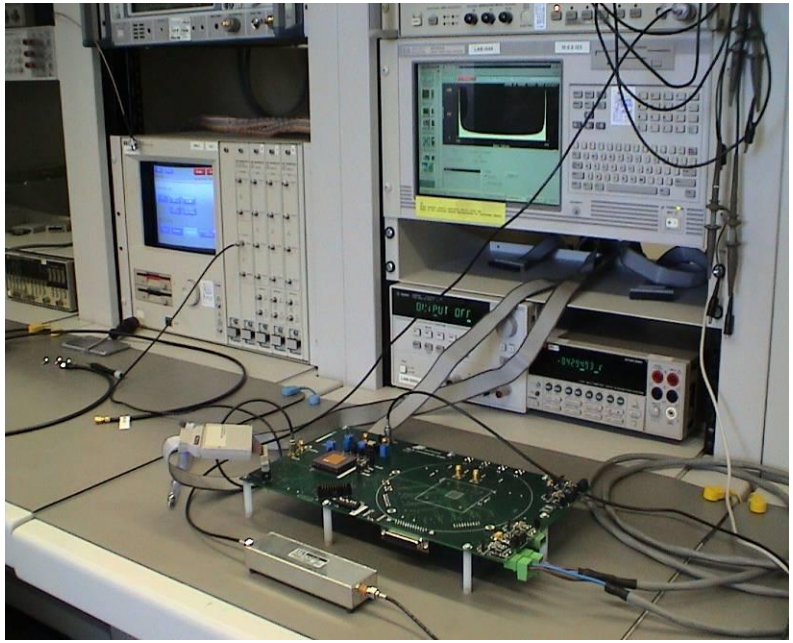
Portugal
Tel. +351 226153400
Fax +351 226101336
E-Mail: info@acl.pt
http://www.acl.pt

Supplies : Through associated PT Lab.

Past Present – PT Companies that supplied CERN

Chipidea – Currently SYNOPSYS® Predictable Success



Micro-electronics
(radhard systems)

ECAL Front-End System

100.000 chips

Collaboration LIP - CERN

inegi

High precision carbon fiber

Muon Alignment Supports (MAB)

Collaboration LIP - CERN

Other companies selected for tendering

Precision mechanics

ARPIAL Metalúrgica Ligeira, Lda

UNHOL

ima PRECISION

Precisomatic SA

Precision Delivery

SIROCO PRECISION

Heat-exchangers

ASP ARSOPI-THERMAL

Cables: electrical & telecommunication, optical fibred, power. Electrical control systems

GRUPO CABELTE

Schneider Electric

Hydraulic facilities

Grupo procme

Energy metering products and fluids counting systems

JANZ

JANZ

Polymers, materials

carfi Fábrica de Plásticos e Moldes SA

Steel structures, metallic pieces (stainless steel)

MARTIFER CONSTRUCTION

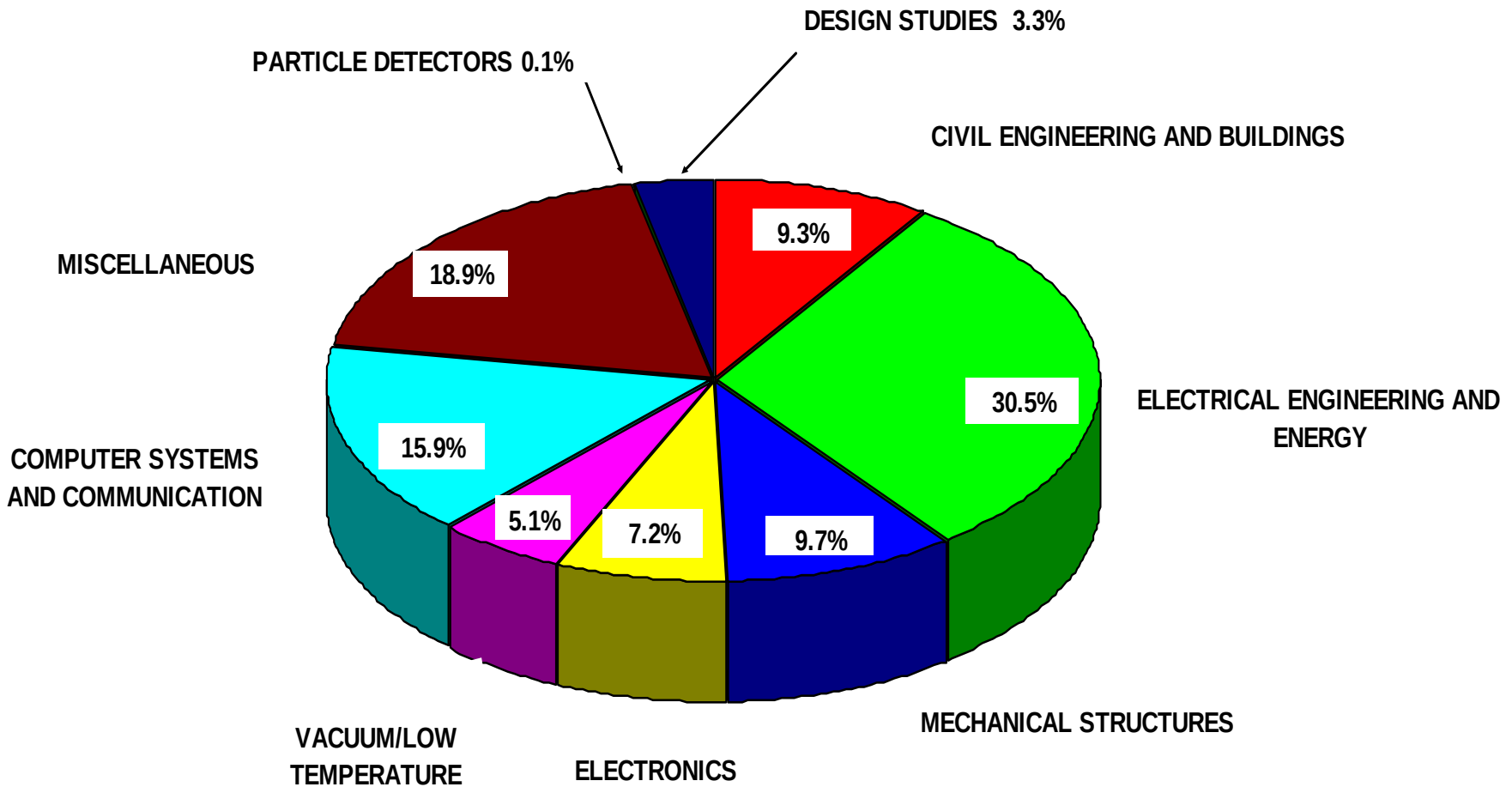
Construction & Assembly of pipelines

setrova

NCP

To date: 134 PT companies registered in CERN database of potential suppliers

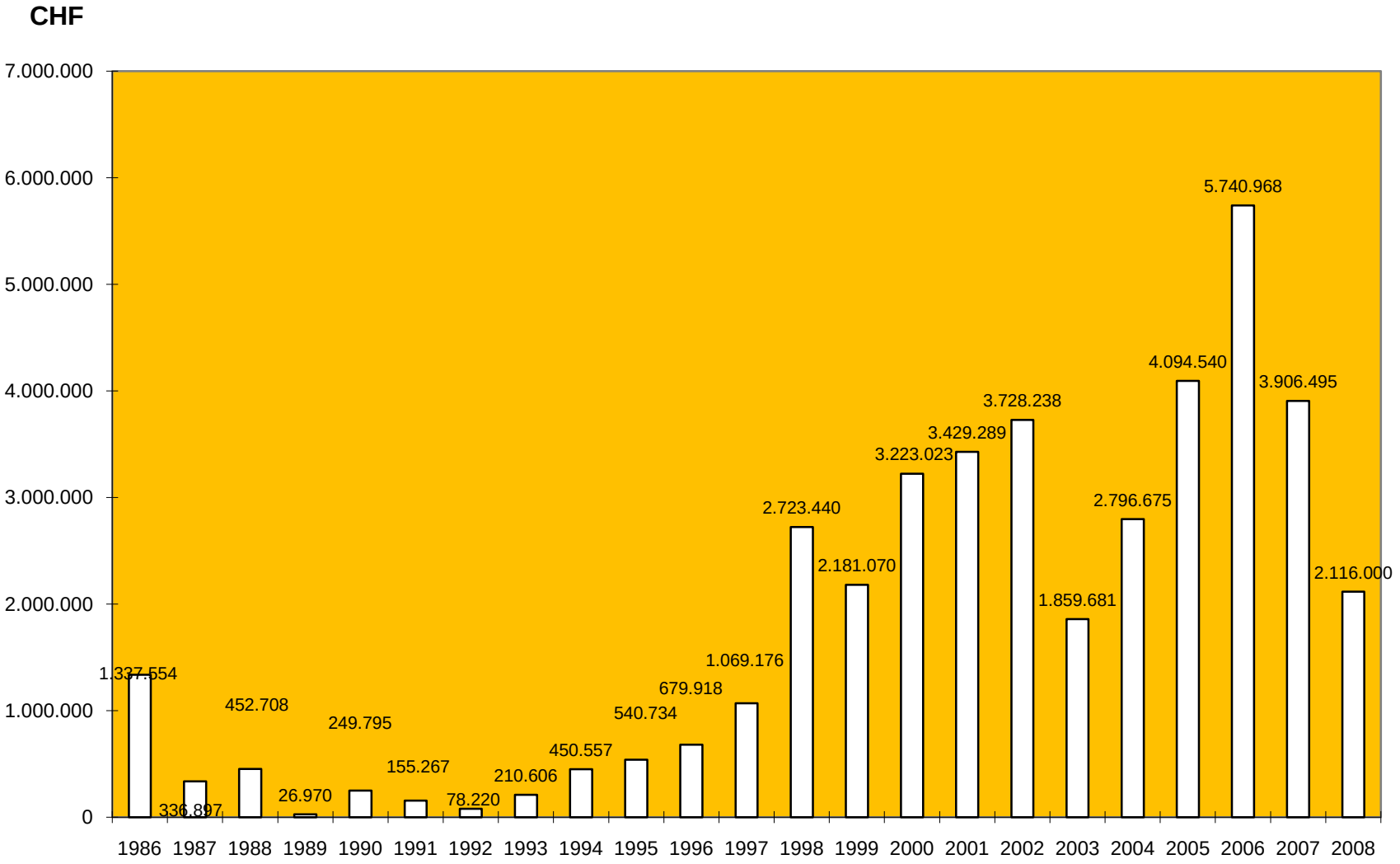
EXPENDITURE IN CERN MEMBER STATES FOR SUPPLIES, CIVIL ENGINEERING AND INSTALLATIONS IN 2008
(Excluding visiting teams and collaborations)



TOTAL COMMITMENTS: 195.8 MCHF

AMOUNT IN SALES BY PT COMPANIES

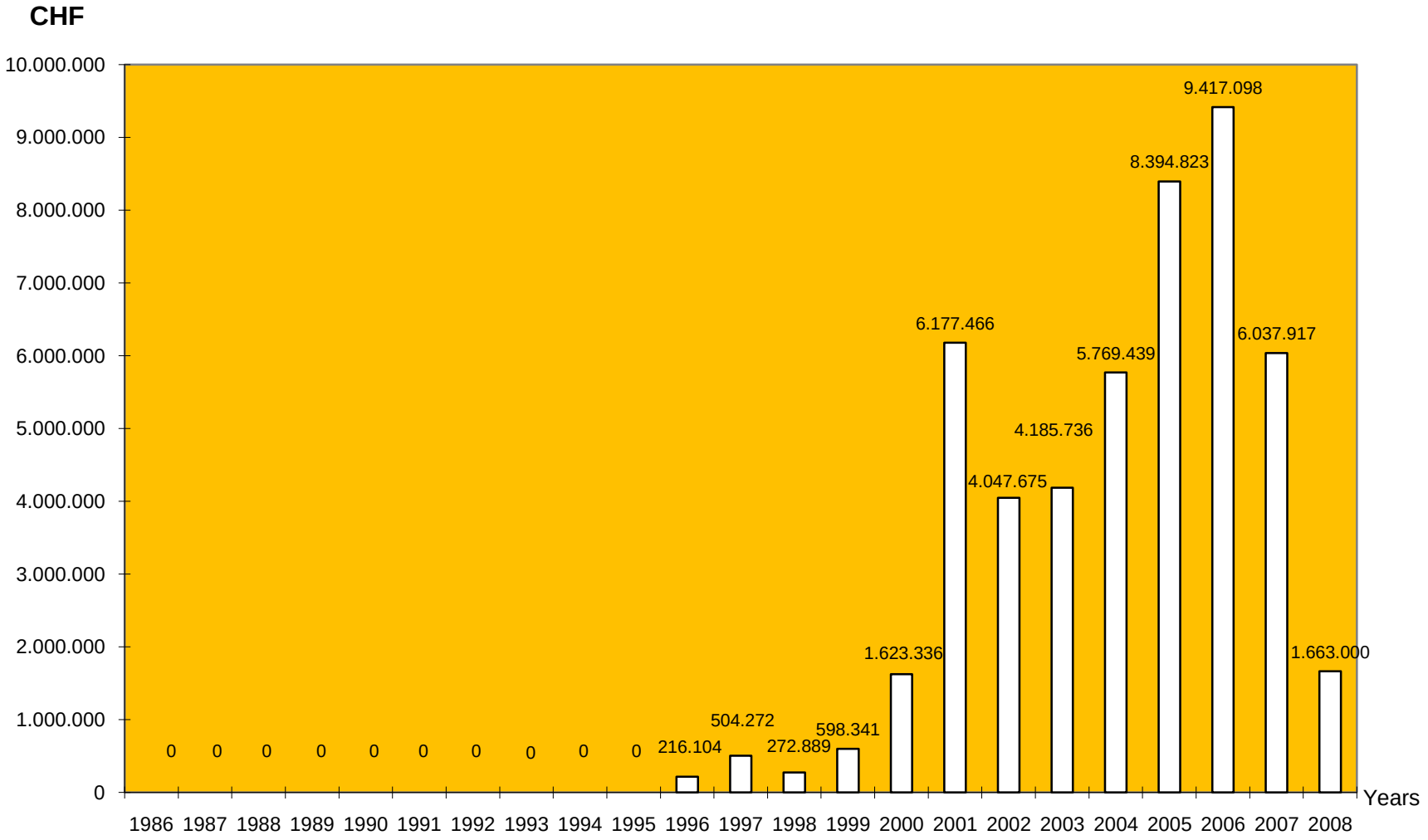
TOTAL AMOUNT IN SALES TO CERN (SUPPLIES)



± 41MCHF (28M€) in exports to CERN since 1986

AMOUNT IN SALES BY PT COMPANIES

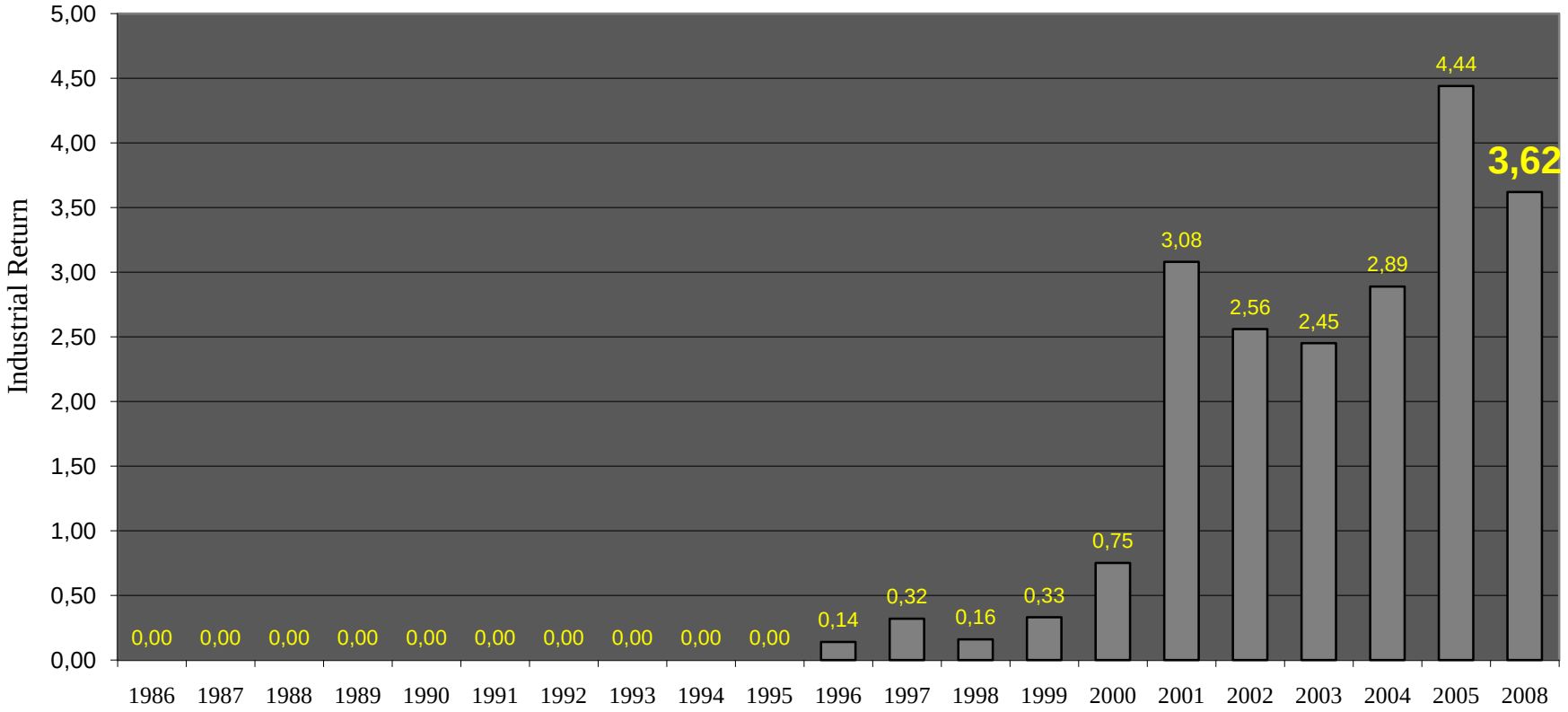
TOTAL AMOUNT IN SALES TO CERN (INDUSTRIAL SERVICES)



± 49MCHF (35,5M€) in exports to CERN since 1986

Industrial Return Coefficient – PT WELL BALANCED MEMBER STATE @ CERN

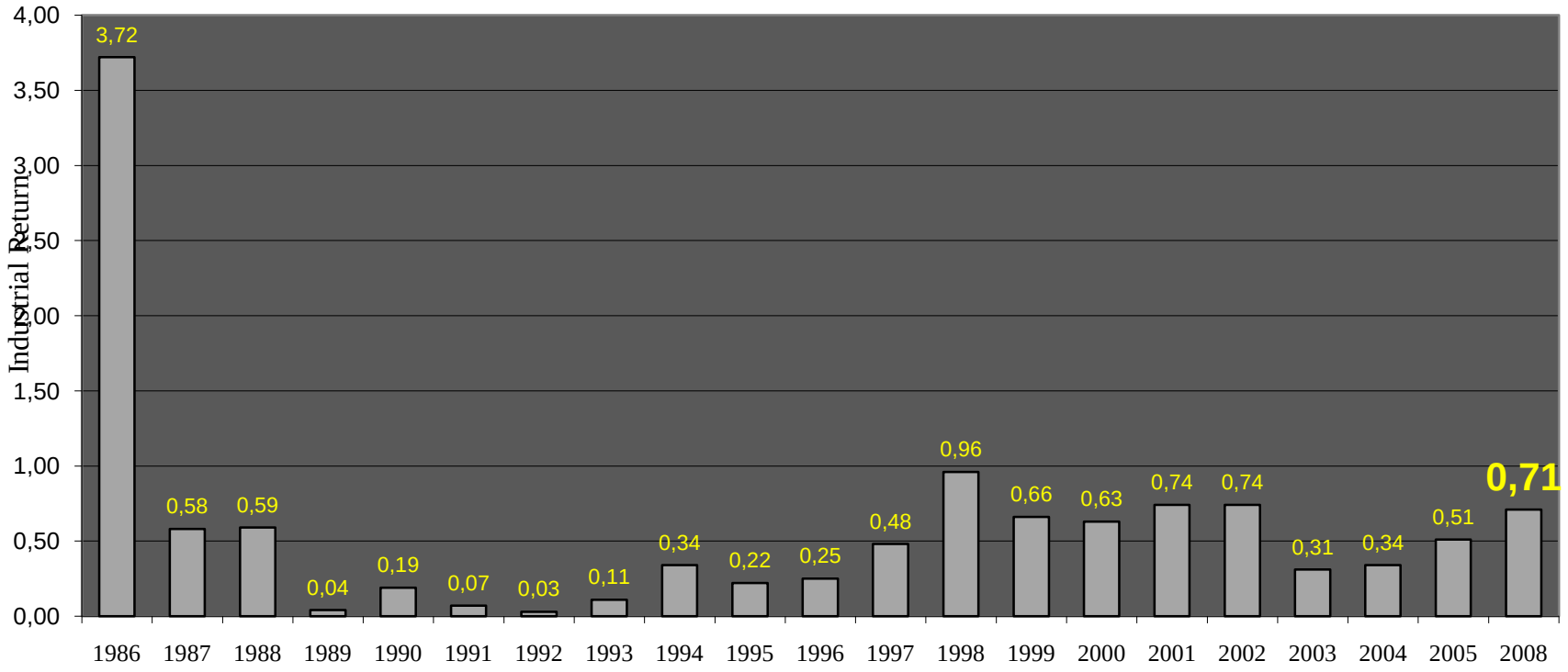
Industrial Return Coeficient
Services Supply Contracts
1986 -2005 & 2008



Note: IR Objective 2008 = 0,40

Industrial Return Coefficient – PT POORLY BALANCED MEMBER STATE @ CERN

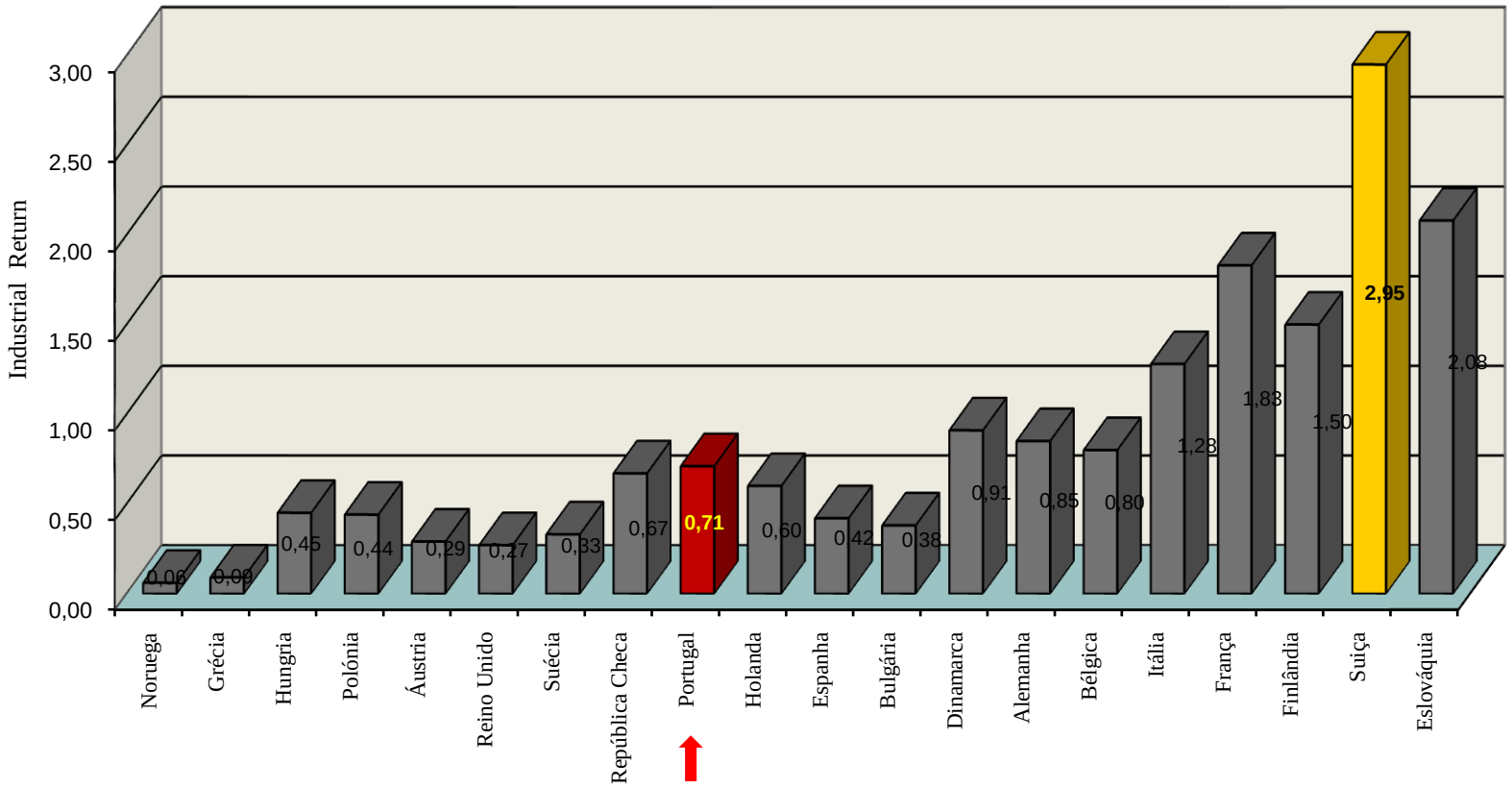
IRC Products Supply Contracts 1986-2005 & 2008



Note: Objective 2008 => 0,92

Industrial Return Coefficient – COMPARED TO OTHER MS

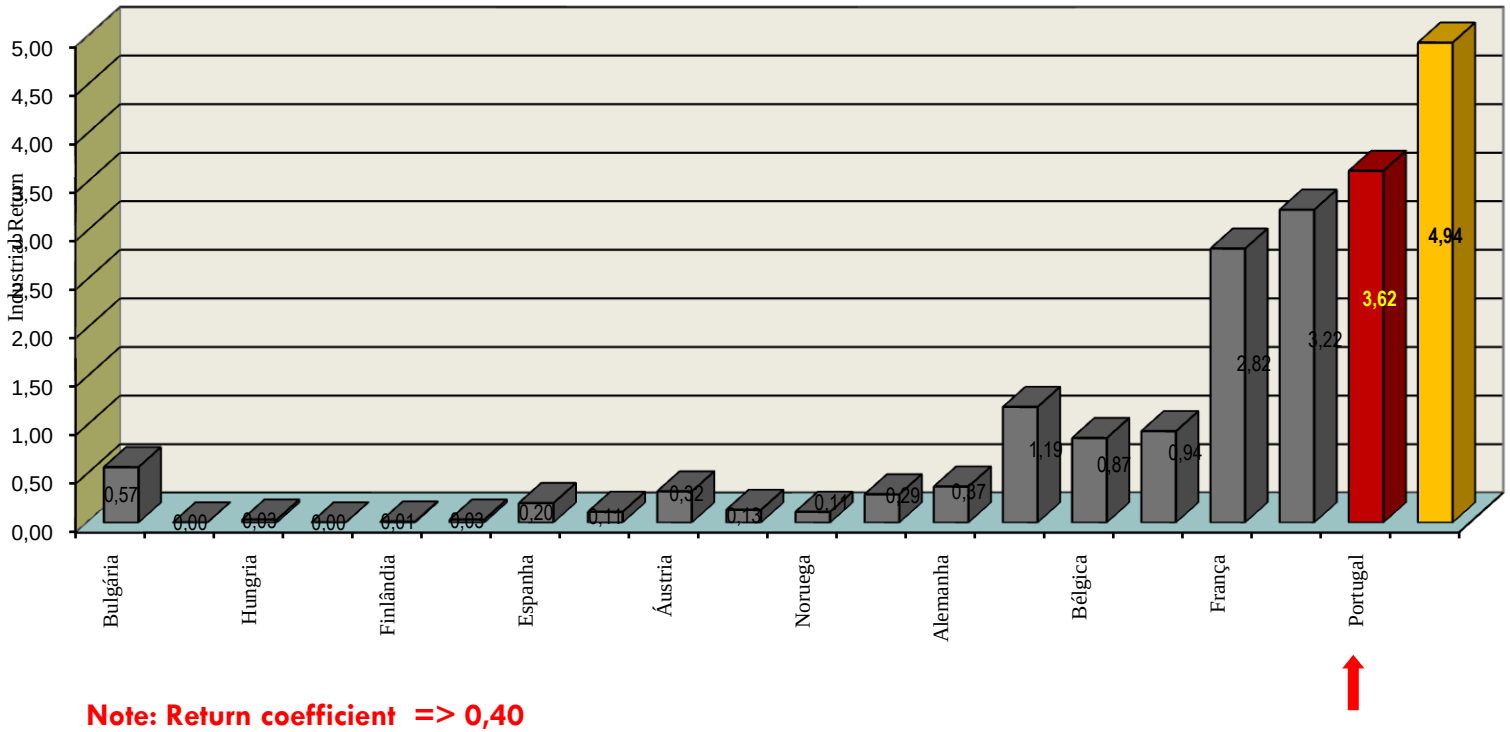
RETURN COEFFICIENT (SUPPLIES) (BASED ON RESULTS OF 2008)



Note: Return coefficient => to 0,93

Industrial Return Coefficient – COMPARED TO OTHER MS

RETURN COEFFICIENT(INDUSTRIAL SERVICES) (BASED ON RESULTS OF 2008)



Note: Return coefficient => 0,40

FORESEEN "short-term" ILO ACTIONS 2010

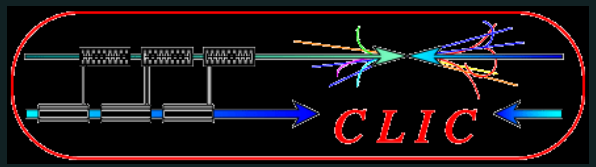
1. "Active" database of PT companies, institutes, projects
2. Engage in national road-show to present the tender opportunities of CERN, ESO, ESRF
3. Joint efforts with *FCT Space Office* regarding all activities involving PT companies
4. Active website to "simply" explain procurement processes and promote technologies that are available for commercialization from CERN, ESO, ESRF

& FOLLOW-UP CLOSELY THE PROCUREMENT ACTIVITIES

CERN

LHC

sLHC



On-going projects @CERN

sLHC

UPGRADE PROJECTS

Linac4

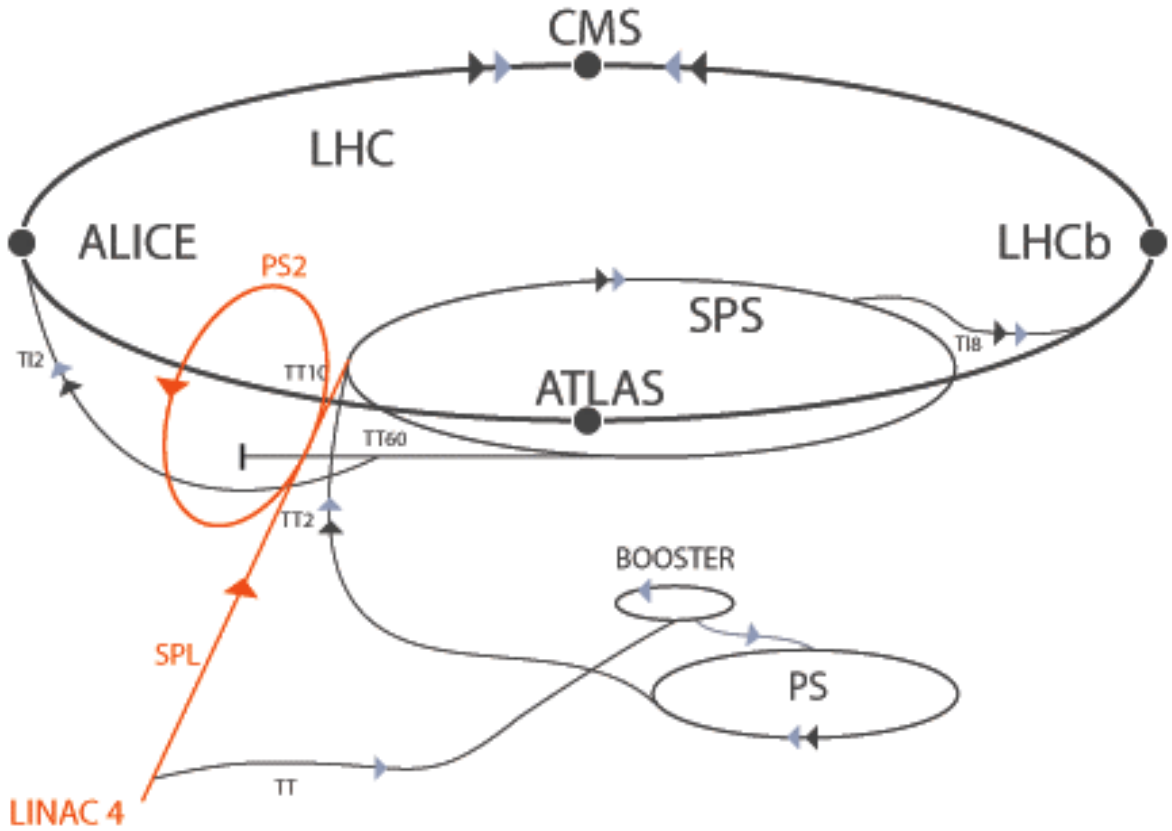
LHC IR Upgrade Phase 1

UPGRADE STUDIES

SPL

PS2

SPS Upgrade



Contact: Steve Meyers

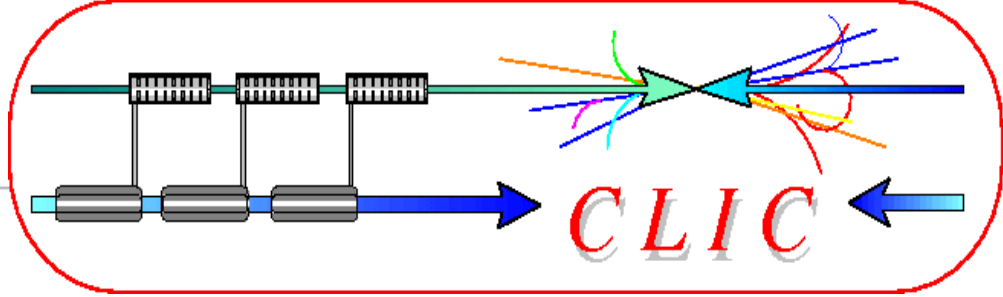
Two Beam Scheme

Drive Beam supplies RF power

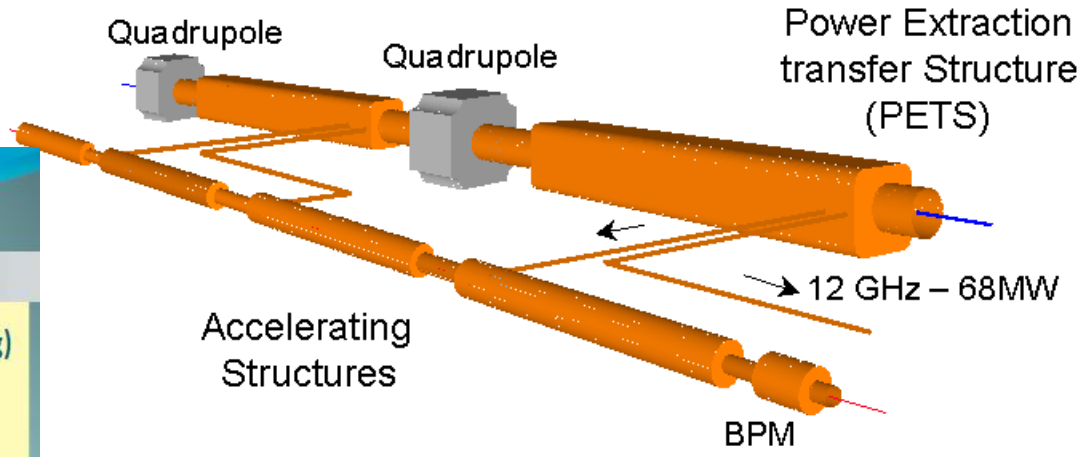
- 12 GHz bunch structure
- low energy (2.4 GeV - 240 MeV)
- high current (100A)

Main beam for physics

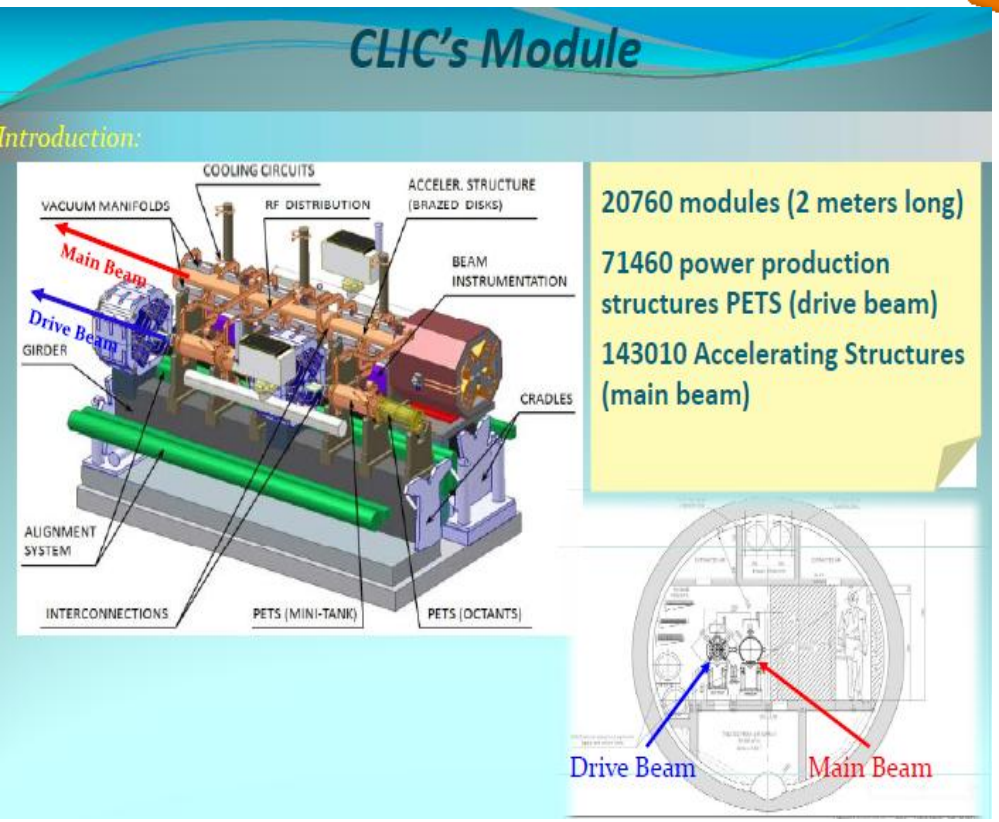
- high energy (9 GeV – 1.5 TeV)
- current 1.2 A



Drive beam – 100 A, 240 ns
from 2.4 GeV to 240 MeV



Main beam – 1.2 A, 156 ns
from 9 GeV to 1.5 TeV



Contact: Jean P. Delahaye

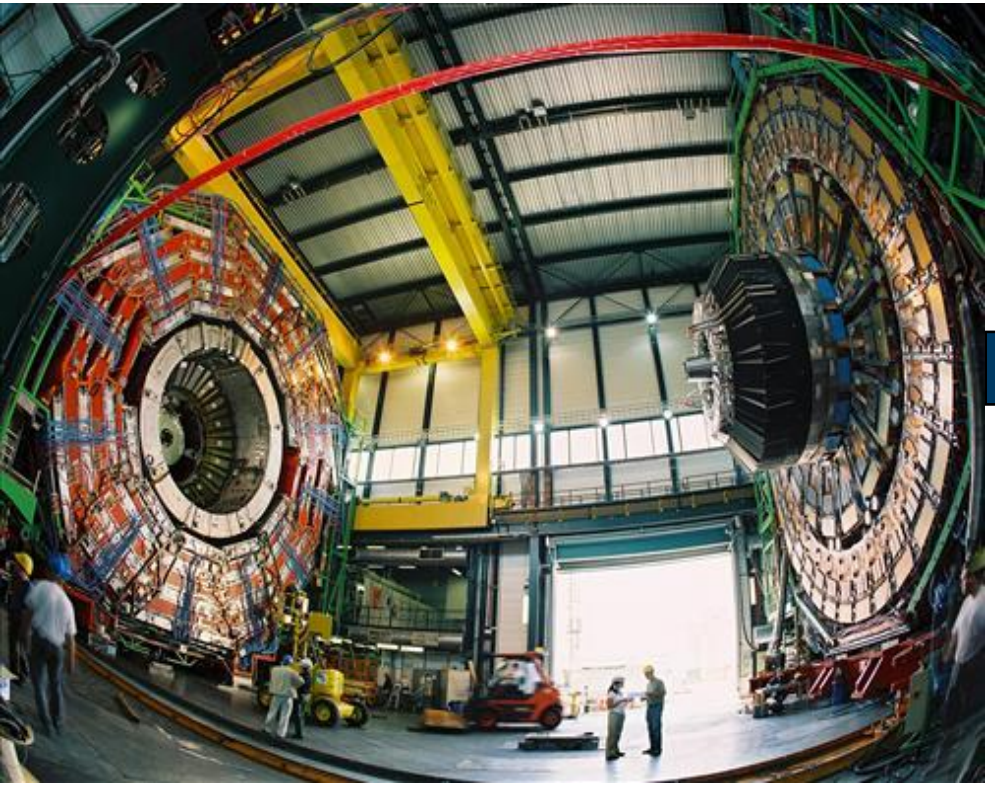
TT @CERN - PORTFOLIO

http://Technologytransfer.web.cern.ch

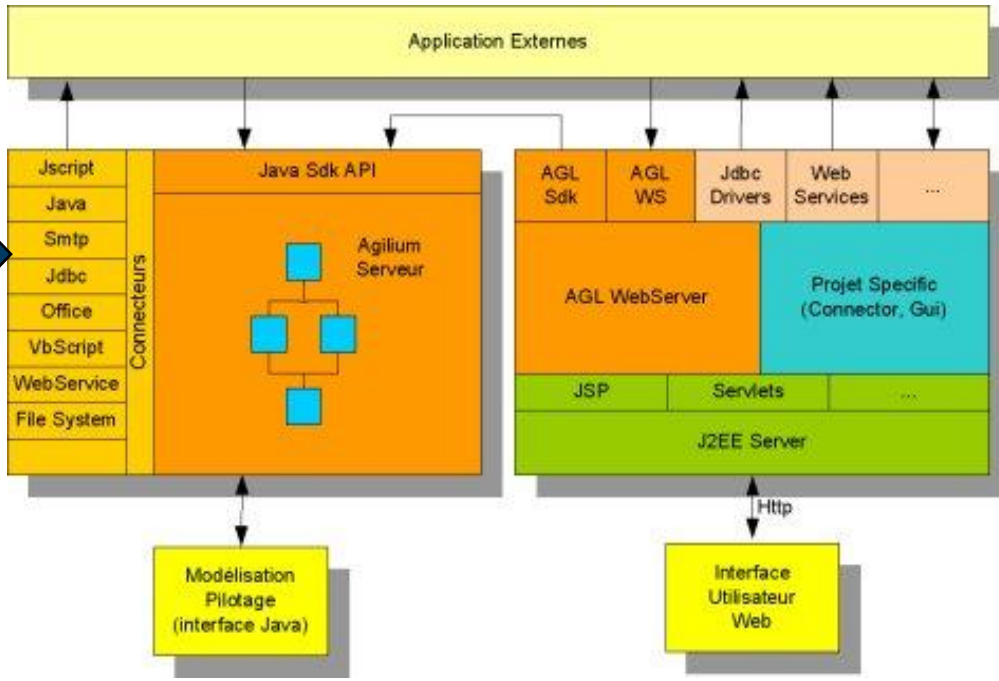
- Maximize technology & Knowlegde return to the Member States industry without diverting from CERN HEP mission
- Promote and enhance the image of CERN as a source of innovation and economic activities and increase attractiveness for industry
- Take all the necessary IP protection measures to support technology dissemination
- Finding an IP management strategy compatible with open science
- Finding the right balance between openness and the commercial exploitation
- Identifying markets for CERN technologies
  - Applications and markets identification outside PP requires dedicated efforts and understanding of potential application domains specific requirements
- Collaborating with industry on basic technologies research while remaining compatible with CERN purchasing rules

Applications outside HEP - CRISTAL

- Software developed to manage the CMS experiment construction and assembly
- Joint development between CERN/CNRS/UWE



- BPM/BAM management system designed to manage business data and processes
- Commercialised by a French start-up: M1i

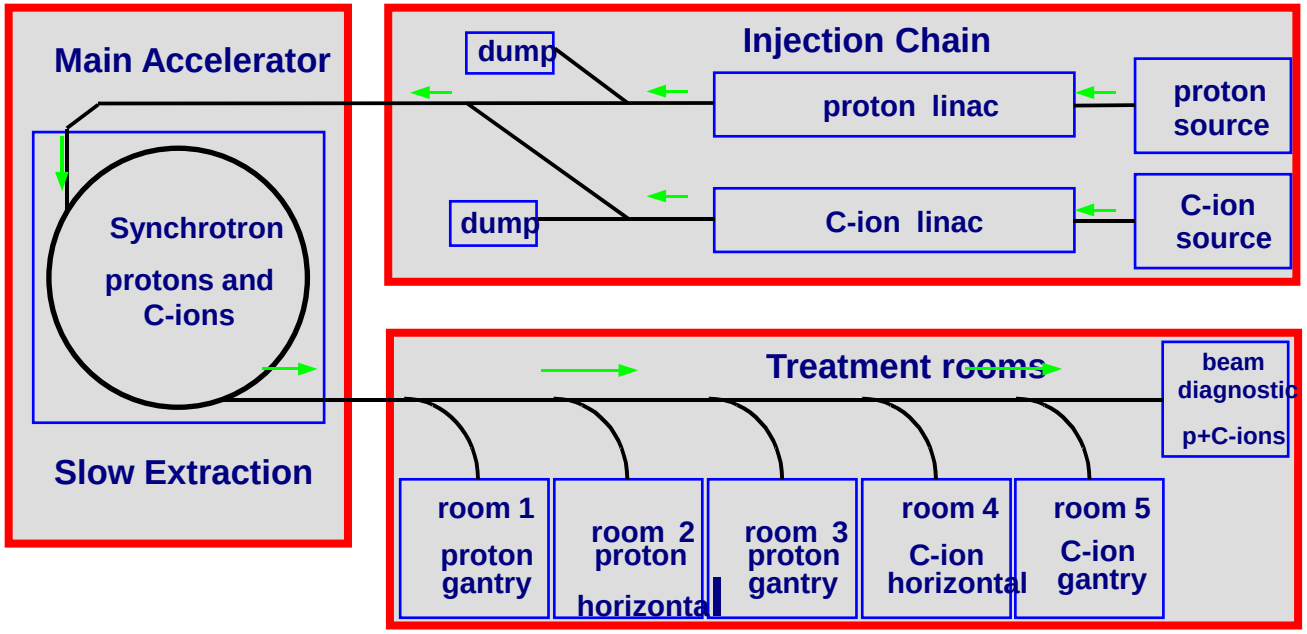


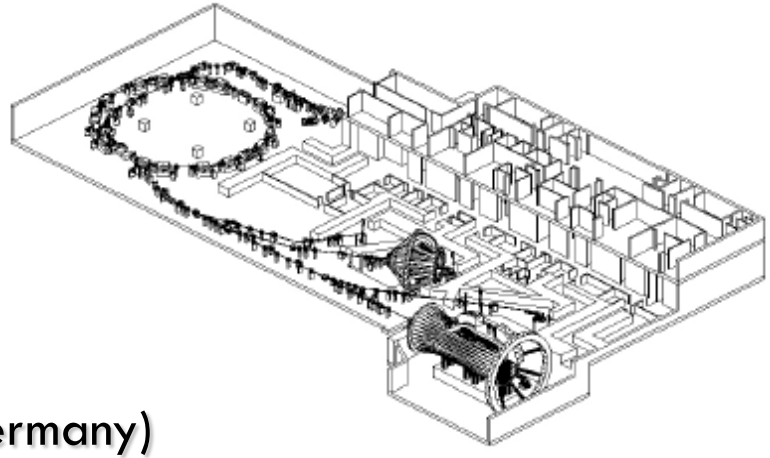
NEG Technology

- Technology (Non-Evaporable Getter thin film coatings) used to create and maintain ultra-high vacuum in the accelerator vacuum chambers.

- **Solar flat panel collector**
  - Proof of concept developed at CERN by the NEG inventor
  - NEG technology used to reduce thermal losses
  - Prototype have been developed with a Spanish start-up company
  - Factory is commissioned and producing panels in Spain

Hadron Therapy: Open science collaboration





High Impact in society – Cancer Treatment

- 48 000 patients have been treated to date,
  many of them being PP centers (ex: in Europe – GSI, Germany)
- 5 dedicated hadron therapy facilities are being constructed.
  In 10 years up to 30 is forecasted (2). CERN is contributing to the construction of CNAO (Italy) and MedAustron (Austria) (Former members of the PIMMS study group).
- Construction costs for the infrastructure of such center is approximately 120 Million EUR. Annual running costs 15 Million EUR.

Crystal Clear Collaboration: PET applications

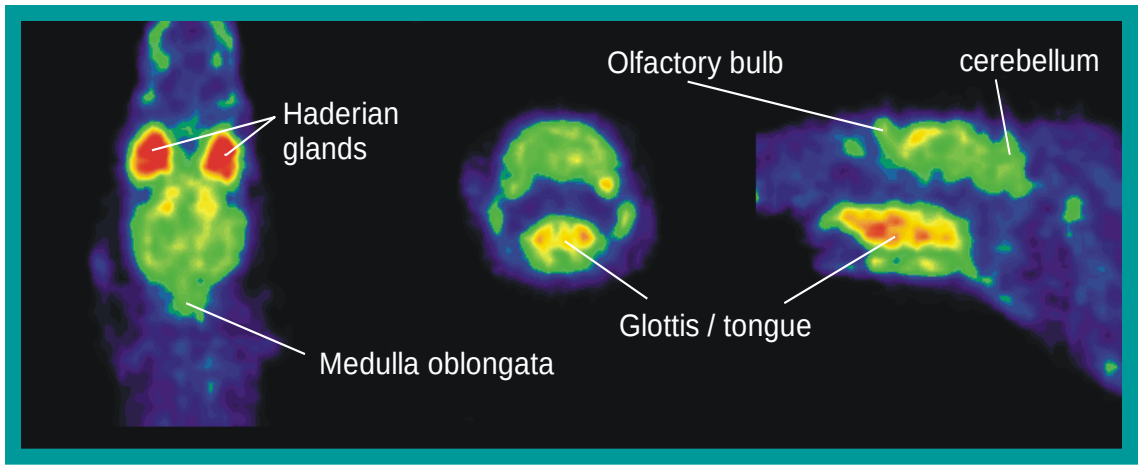
From calorimetry (RD18) to PET applications

Attractive market perspectives for whole body PET/CT's:

•Generalized use of PET technologies across multiple domains of medical diagnostics

•Attractive opportunities for dedicated PET also in niche markets:

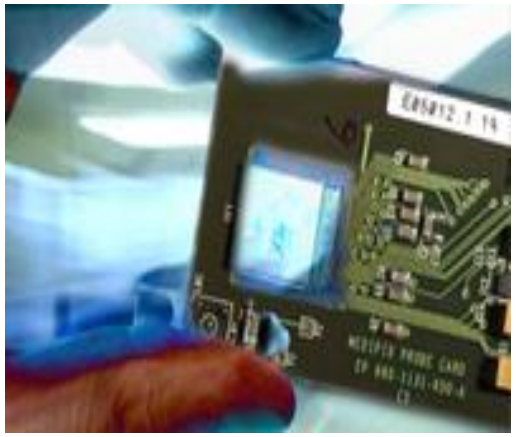
- Small animal PET's (raytest, drug discovery)
- Mammography, Brain devices



Crystal Clear Collaboration: Small animal PET for in-vivo drug screening

MEDIPIX

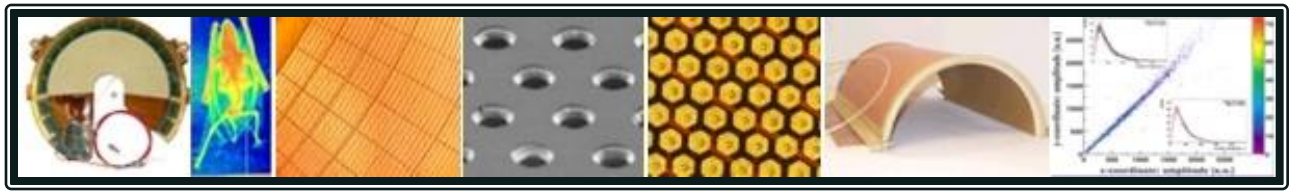
- Medipix2 collaboration (17 institutes)
  - Development of an ASIC with a high spatial, high contrast resolving CMOS pixel read-out chip working in single photon counting mode.

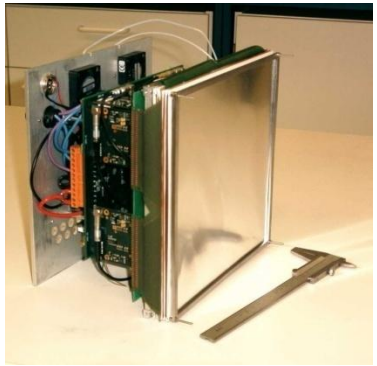
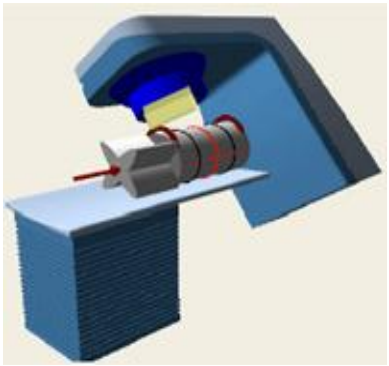
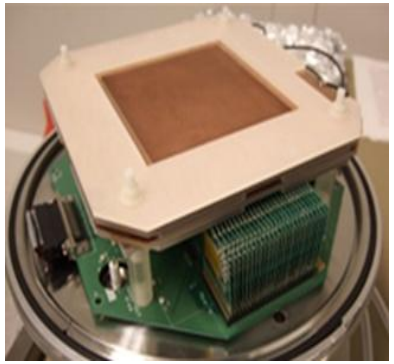


- PIXcel
  - X-Ray diffractometer
  - Developed and commercialised by a Dutch company

PANalytical

GASEOUS DETECTORS - GEMs



Neutron Physics Detector	X-Ray Detector system	Radiation detection system	Beam monitoring system - RT
			

CASCADE

SciEnergy

ScandiDos

C-RAD

EU Start-ups, SMEs & Multinationals that acquired CERN Know-how & Technology

Sealing and protection systems

PXL INDUSTRIES

TECHTRA
TECHNOLOGY TRANSFER AGENCY

http://www.venicosoftware.com/

interon

Advanced Accelerator Applications

Techspace Aero
SAFRAN Group

METROlab
Magnetic precision has a name

IJSPEERT Innovative Technologies

Sagem
SAFRAN Group

PETsys
Medical PET Imaging Systems

maatG

TAKE AWAY MESSAGES

- Basic research has a strong impact on technology developments and innovation
- Technology developed for science has major repercussions on the global community
- Technology developed for science is a source for **Industry** that leads to important business prospects
- Fundamental science accelerates the industrial process and improves daily life
- Many issues, including funding are limiting the impact of public research to industry and society

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THANKS FOR THE ATTENTION!!!