SPAIN AT CERN
M. AGUILAR-BENITEZ
IN THE EARLY SIXTIES

SPAIN WAS A COUNTRY WITH

- WEAK TRADITION IN MODERN PHYSICS
- LOW LEVEL TEACHING OF MODERN PHYSICS AT THE UNIVERSITIES
- NO EXPERIMENTAL FACILITIES
- RATHER FRAGILE INDUSTRIAL AND TECHNOLOGICAL INFRASTRUCTURES
FIFTY YEARS LATER, THEORETICAL PHYSICS IN SPAIN HAS BECOME A LARGE, PRESTIGIOUS AND WELL RECOGNIZED COMMUNITY AT THE INTERNATIONAL LEVEL

WELL ESTABLISHED GROUPS IN BARCELONA, GRANADA, MADRID, SANTIAGO DE COMPOSTELA, VALENCIA, ZARAGOZA, .... DO OUTSTANDING RESEARCH IN FRONTIER FIELDS
1961: Spain became CERN member state

Fairly modest start-up in experimental high energy physics
SPAIN DROP OUT FROM CERN IN 1969, TO COME BACK 14 YEARS LATER

A MAJOR BLOW
THE SEVENTIES
SACLAY 81cm BC

CERN 2m BC

R. ARMENTEROS
L. MONTANET

CH. PEYROU
IMFP
“INTERNATIONAL WINTER MEETING ON FUNDAMENTAL PHYSICS”
FORMIGAL 1973
FORMIGAL 1997
THE EIGHTIES

THE WAY TOWARDS PARTIAL CONSOLIDATION AND GROWTH
S.C.C.TING (1981)

INVITATION TO JOIN MARKJ (PETRA)
S.C.C.TING (1981)

INVITATION TO JOIN L3 (LEP)
CONCEDIDA por las Cortes Generales la autorización prevista en el artículo 34.1 de la Constitución y, por consiguiente, cumplidos los requisitos exigidos por la Legislación española, entiendo el presente Instrumento de Adherción de España al Convenio para la creación de una Organización Europea de Investigación Nuclear, hecho en París el uno de julio de 1983, para que, mediante su deslinde y de conformidad con lo dispuesto en su Artículo XVII, España pase a ser Parte de dicha Convención.

En fe de lo cual firma el presente Instrumento, debidamente sellado y renunciado por el infrascrito Ministro de Asuntos Exteriores.

Dado en Madrid, a ...día de noviembre de mil novecientos ochenta y tres...

[Signature]

Fernando Illana

El Ministro de Asuntos Exteriores.

[Signature]

1984: CERN 30th ANNIVERSARY
STEERING PLAN FOR HEP (1984)

J.A. RUBIO

J.M. ROJO

J.A. RUBIO, M. AGUILAR, A. FERRER, C. PAJARES, P. PASCUAL, R. OTERO

PLAN MOVILIZADOR DE LA FISICA DE ALTAS ENERGIAS
STEERING PLAN FOR HEP (1984)

JEN-CIEMAT
U. VALENCIA (IFIC)
U. SANTANDER (IFCA)

U.A. BARCELONA (IFAE)
U.A. MADRID
U. SANTIAGO DE COMPOSTELA

U. ZARAGOZA
CSIC MADRID

U. BARCELONA
U. GRANADA
U. OVIEDO

• PROTOTYPE FOR THE NATIONAL R&D PLAN (1986)
• IMPLEMENTED A NOVEL REVIEW PROCESS BY EXTERNAL REFEREES
• SET-UP OF THE FIRST RESEARCH COMPUTER NETWORK (FAENET)
THE LARGEST UNDERTAKING IN THE MID 80s

PARTICIPATION IN THE CONSTRUCTION OF
ALEPH, DELPHI, L3

ALEPH: IFAE-BARCELONA
DELPHI: IFIC-VALENCIA, IFAE-SANTANDER
L3: CIEMAT-MADRID
ALEPH
LUMI. MONITOR &
FALCON

DELPHI
FEM & TOF
A. FERRER (VALENCIA), A. RUIZ (SANTANDER)  
E. FERNÁNDEZ (BARCELONA)

PARTICIPATION IN DELPHI, ALEPH (LEP)
F. BARREIRO (MADRID)

PARTICIPATION IN PLUTO-TASSO-ZEUS (PETRA-HERA)
ISOLDE (1984)

M.J. GARCÍA BORGE, CSIC-MADRID

LATER JOINED BY IFIC, VALENCIA
CANFRANC UNDERGROUND LABORATORY (1985)

JULIO & ANGEL MORALES
U. ZARAGOZA
CIEMAT JOINS UA1 (1986)
COORDINATION EFFORTS TOWARDS THE CREATION OF A NATIONAL CENTRE

Jaca (1977)
Barcelona (1989)
Toledo (1993)

Santiago de Compostela (1995)
Gran Canaria (1997)
Valencia (1999)
Sevilla (2001)
Madrid (2003)

Orense (2005)
Granada (2007)
Ciudad Real (2009)
Santander (2011)
Valencia (2013)
Oviedo (2015)

HIGH ENERGY PARTICLE PHYSICS DIVISION AT THE ROYAL SPANISH PHYSICS SOCIETY
THE LAST 25 YEARS

VISIBILITY, RECOGNITION, "MODERATE" SUCCESS
“MODERATE” SUCCESS

GREAT DEAL OF PROGRESS ACOMPLISHED

PLENTY OF WORK AHEAD
SCIENTIFIC EXPLOITATION OF LEP DATA

ALEPH: IFAE-BARCELONA

L3: CIEMAT-MADRID

DELPHI: IFIC-VALENCE, IFCA-SANTANDER
HERA-B @ DESY (1996)
U. Barcelona

nTOF @ CERN (1994)
CIEMAT, IFIC, UPC, UPM, U. Sevilla, U. de Santiago de Compostela
IFCA-SANTANDER JOINS CDF (1999)

IFAE, CIEMAT JOINED LATER (2003, 2005)
HIGH PRIORITY: PARTICIPATION IN THE LHC PROJECT
CONTRIBUTIONS TO THE CONSTRUCTION OF THE LHC
PARTICIPATION IN THE CONSTRUCTION OF ATLAS, CMS, LHCb

CMS: CIEMAT, IFCA, UA MADRID, U OVIEDO

ATLAS: IFAE, IFIC, UA MADRID

LHCb: UB-ICC, U SANTIAGO, U RL
ATLAS TILE CALORIMETER
IFAE-BARCELONA & IFIC-VALENCIA
PIC
PUERTO DE INFORMACIÓN CIENTÍFICA
LHC TIER 1
CIEMAT – GENERALITAT DE CATALUNYA
CONSORTIUM (2003)
The Worldwide LHC Computing Grid (WLCG)

Tier-0 (CERN):
- Data recording
- Initial data reconstruction
- Data distribution

Tier-1 (12 centres):
- Permanent storage
- Re-processing
- Analysis
- Simulation

Tier-2 (68 federations of >100 centres):
- Simulation
- End-user analysis
PARTICIPATION IN THE COMMISSIONING OF THE DETECTORS, DATA TAKING & PROCESSING, DATA ANALYSIS, RESULTS, UPGRADES
~90% of the matter in the Universe is not visible, called Dark Matter. Collisions of Dark Matter will yield characteristic distributions of charged cosmic rays which can be detected by AMS.
MAGIC (1997)
IFAE, U.C. MADRID, U.A. BARCELONA, CIEMAT, ...
AMS (1997)
CIEMAT, IAC
ANTARES (1997)
IFIC

- 12 lines
- 25 storeys / line
- 3 PMTs / storey
- 900 PMTs

14.5 m

~70 m

350 m

40 km to shore

100 m

Anchor/line socket

Junction Box

Submarine links

~70 m
AUGER (2001)
U. SANTIAGO, U.C. MADRID, GRANADA, ...
Cherenkov Telescope Array

Instituto de Astrofísica de Canarias

Universidad Complutense de Madrid
A TAU-CHARM FACTORY LABORATORY IN SPAIN
combined with a SYNCHROTRON LIGHT SOURCE
(A conceptual study)

Y. Baconnier, J.-L. Baldy, J.-P. Delahaye, R. Dobinson,
A. De Rújula, F. Ferger, A. Hofmann, J.M. Jowett,
J. Kirkby, P. Lefèvre, D. Möhl, G. Plass, L. Robertson,
J. A. Rubio, T.M. Taylor and E.J.N. Wilson
CERN, Geneva, Switzerland
F. Dupont and J. le Duff
LAL, Orsay, France
C. Willmott
CIEMAT, Madrid, Spain

Abstract

A conceptual design for a $\tau$-charm factory and its associated laboratory is
given. It includes the physics interest, a description of the scope and layout of
the new laboratory in Spain, the $\tau$-charm factory collider and detector, the
injector system and a synchrotron light source, together with estimates of the
time-scale and necessary resources.

Geneva, Switzerland
20 November 1990
THE SAGA OF THE TAU CHARM FACTORY

Barcelona as Site for a TCF

TAU CHARM FACTORY

Generalitat de Catalunya

LLS Detailed Design Report

DECEMBER 1997
ALBA SYNCHROTRON
BARCELONA (2002-2010)
DES (2006)
IFAE, IEEC, CIEMAT, UAM, ….
PAU (2008)
IFAE, IEEC, CIEMAT, UAM, IAC, ....
IFAE, IFIC

DOUBLE CHOOZ (2006)
CIEMAT
NEXT-LSC (2000)
IFIC, U. ZARAGOZA
DARK MATTER PHYSICS
AT LSC
ANAIS, ArDM
**R&D FUTURE DETECTORS & COLLIDERS**

- **DEPFET** (IFIC, IFCA, UB, IMB-CNRM, USC, ITA)
- **CALICE** (CIEMAT)
- **ILC, ATF-ATF2** (IFIC, IFCA, UB, IMB-CNRM, USC, ITA)
  - BEAM DYNAMICS, INSTRUMENTATION, BPM
  - MAGNET PACKAGE FOR ILC MAIN LINAC
- **CTF3-CLIC, ILC** (CIEMAT)
  - QUADRUPOLE MOVER, PETS, ORBIT CORRECTORS, KICKERS, SEPTA
  - MAGNET PACKAGE FOR ILC MAIN LINAC
WHERE WE STAND
EXPERIMENTAL HEP IN 1984

Madrid (JEN)

Santander

Valencia (IFIC)
“MODERATE” SUCCESS

- RELEVANT PARTICIPATION IN THE MOST IMPORTANT AREAS OF THE CERN EXPERIMENTAL PROGRAM AND IN OTHER INTERNATIONAL PROGRAMS (DESY, FERMILAB, SLAC, KEK, ...)

- DIVERSIFICATION (COSMIC-RAYS, NEUTRINOS, COSMOLOGY, ...)

- ATTRACT & COLLABORATE WITH MANY INDUSTRIAL FIRMS

- TRAINING OF HUNDREDS OF SCIENTISTS, ENGINEERS, TECHNICIANS
THE KEY FOR “MODERATE” SUCCESS

THE YOUNGER GENERATIONS ARE BETTER THAN THE OLD ONES

“Men of age object too much, consult too long, adventure too little, repent too soon, and seldom drive business to the full period, but content themselves with a mediocrity of success”

Francis Bacon
THE KEY FOR “MODERATE” SUCCESS

THE NATIONAL PROGRAM FOR HEP & INSTITUTIONAL SUPPORT

1984-2008: **
2008-2014: **

STILL A LONG WAY TO GO
THE KEY FOR “MODERATE” SUCCESS

RELEVANT INSTITUTIONAL INITIATIVES AT THE NATIONAL LEVEL

- 1984: HEP National Program
- 2001 & 2010: Ramón y Cajal & Juan de la Cierva Programs (~120 Temporary Positions)
- 2011: Severo Ochoa Program (IFAE-Barcelona, IFT-Madrid)
- 2007: Consolider Projects (CUP, PAU, Multidark)
- 2007: CPAN-Centre for Particle, Astroparticle and Nuclear Physics (~150 Temporary Positions)
CONCERNS

BUDGETARY CUTS SINCE 2010

• AT THE RESEARCH UNITS, IN PARTICULAR AT CIEMAT AND CSIC (VERY LARGE)

• IN THE NATIONAL PROGRAM (LARGE)

• CPAN: VERY UNCERTAIN FUTURE

UNBEARABLE BUREAUCRATIC LOADS
LARGEST CONCERN

• VERY FEW NEW POSITIONS FOR RESEARCHERS WITH EXCELLENT SCIENTIFIC CAREERS
• DANGER OF LOSING VERY HIGH QUALITY HUMAN RESOURCES

IRRETRIEVABLE LOSS OF OUR MOST PRECIOUS PATRIMONY

HUGE DAMAGE
PENDING ISSUES

• STRENGTHEN COORDINATION

• ENFORCE PRIORITIZATION

• IMPROVE MANAGEMENT

CPAN MUST BE CONSOLIDATED
• **2513 Staff (31.12.2013)**
• **10611 Users**
• **566 Fellows**
• **1180 Appr./Stud. & Train./Assoc.**
• Contributions from MS (2014): 1108,5 MCHF (~908,6 M Euros)

• **126 Staff (5,0 %)**
• **316 Users (3,1 %)**
• **75 Fellows (13,2 %)**
• **128 Appr./Stud. & Train./Assoc. (10,8 %)**
• Contribution to Income (2014): 8,28 %: 91,78 MCHF (~ 75,2 M Euro)
CANDID APPRAISAL

- CERN MEMBERSHIP HAS BEEN A WONDERFUL OPPORTUNITY FOR SPANISH SCIENCE, NOT ONLY FOR PARTICLE PHYSICS. EDUCATION IN GENERAL, INDUSTRY AND INNOVATION HAVE ALSO GREATLY PROFITED FROM IT.

- CERN HAS ALSO PROFITED FROM HAVING SPAIN AMONG ITS MEMBER STATES, NOT ONLY FOR FINANCIAL REASONS. THE ADVENT OF A HIGHLY MOTIVATED, COMPETITIVE AND WELL TRAINED COMMUNITY IS AN IMPORTANT ASSET FOR THE FUTURE OF THE ORGANISATION.
PERSONAL REMARKS

- WE ARE GOING THROUGH VERY DIFFICULT TIMES
- REFRAIN FROM DREAMING (.. WHEN THE NIGHT IS LONG .. )
- TRY HARDER
- MAINTAIN CREDIBILITY (PRIORITIES & SCHEDULES & COSTS & EXPENSES, etc.)
- EDUCATE SOCIETY ON THE TRUE VALUE OF BASIC RESEARCH

KEEP CALM AND POSITIVE THINKING

BE HONEST AND DO GOOD SCIENCE
HAPPY BIRTHDAY TO CERN !!
Goodbye and Good Luck
THANKS