# Nuclear and Particle Physics

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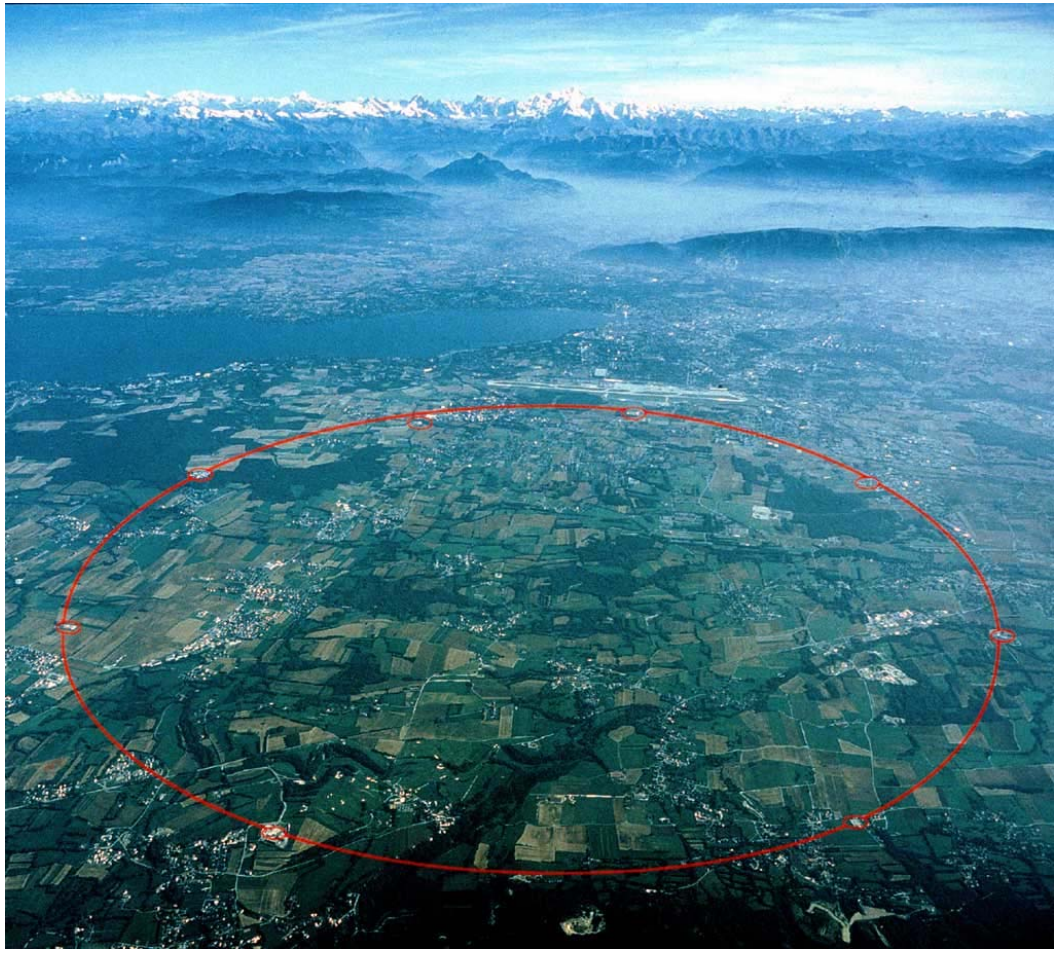
IN2P3/CNRS

# Particle and Nuclear Physics Research

- International
  - Large Scale Equipments (LHC)
  - Scattered expertise
- Fundamental
  - Ultimate components of matter
  - Unifying the fundamental forces
  - Origin of the Universe
- Sharing knowledge
  - Bridging the Knowledge gap
  - Obscurantism is still with us
  - Human Emancipation



**INTERNATIONAL COLLABORATIONS ARE A NEED AND A MUST**

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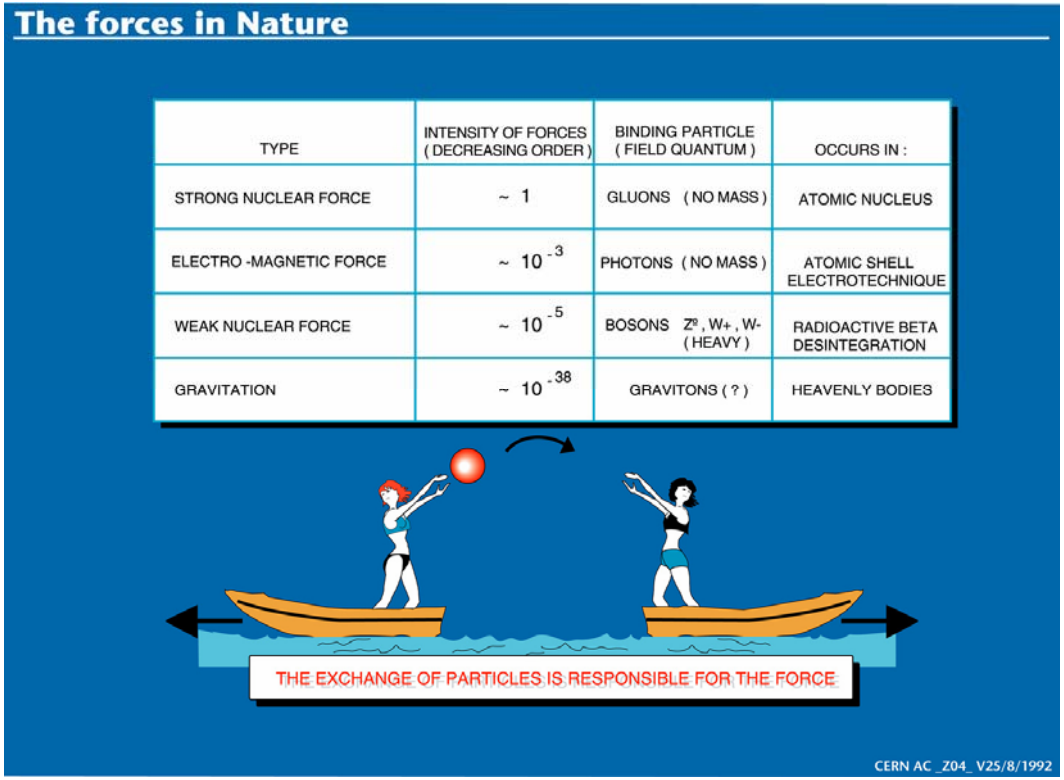


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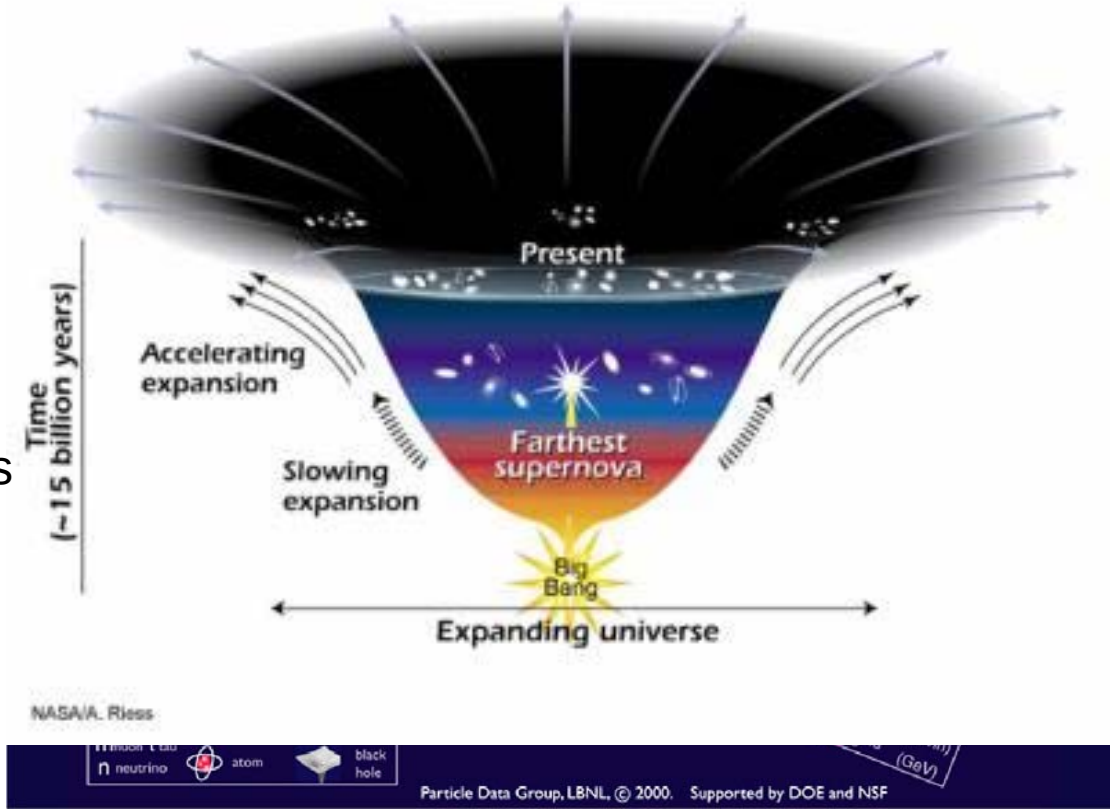


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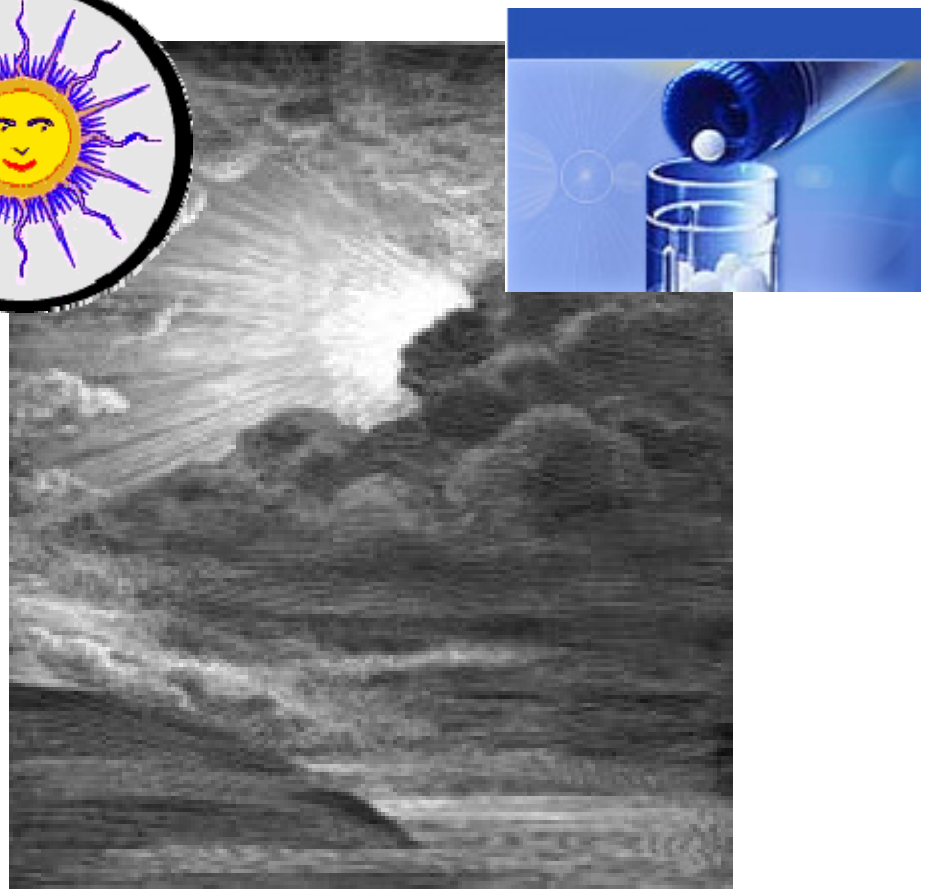


… and there was light.

**INTERNATIONAL COLLABORATIONS ARE A NEED AND A MUST**

# Programmes

## Running:

– ACPP IRG (Automated Calculations in Particle Physics) (GDRI) SPM

– PICS (Neutrino Physics: Collaboration “Opera”)

– …

## New projects:

– IT GRID (Tokyo Univ., KEK, NEREGI) STIC

– IAL Nuclear Physics with RIKEN, MOU with Osaka Univ.

– IAL Particle Physics with KEK

# International Research Group

## ACPP: Automated Calculation in Particle Physics

***SPM-IN2P3***

- 48 physicists from France, Russia, Japan
  - Russia: **Lomonosov Moscow State Univ.(14), Russian Academy of Science(2)**
  - Japan: **KEK: Minami-Tateya collaboration(19)**
  - France: **CNRS(9), Univ. de Savoie, Clermont 2(1), Montpellier 2(2), Paris. 11(1)**
- Main packages:
  *Grace, Grace 1-L (28 pub), CompHEP, LanHEP, CalcHEP (30 Pub)*
- For LHC, ILC, Astro-Particle Physics
  *GRC4F (147 cit.), micrOMEGAs,…*

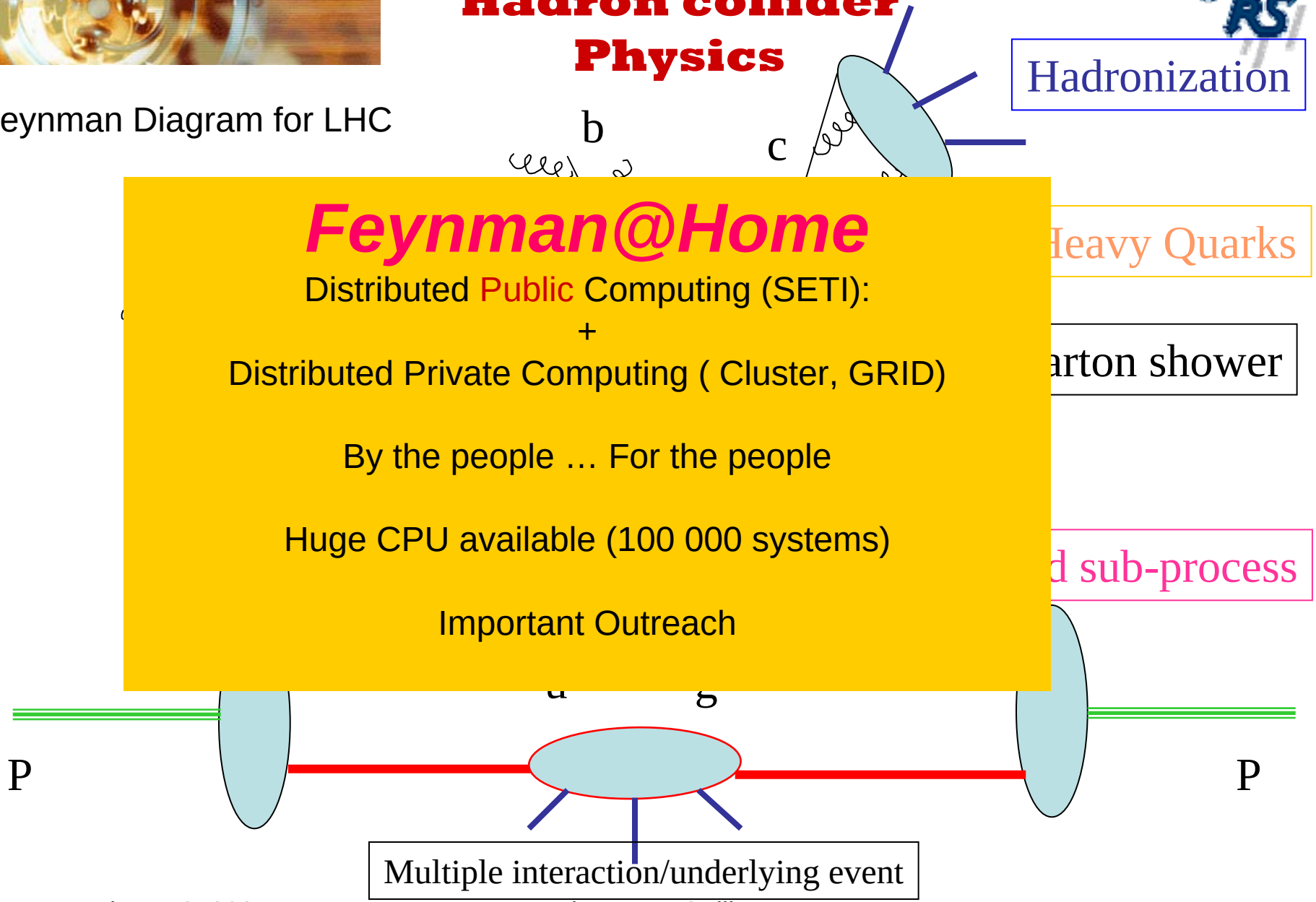
**Signed Dec. 2004**


# Radiative Corrections to Higgs processes by GRACE For International Linear Collider

| processes | # of tree (all) | # of 1-loop (all) | published |
|---|---|---|---|
| $e^+e^- \to \nu\bar{\nu}H$ | 12 | 1350 | **Phys. Lett. B559(2003)252** |
| $e^+e^- \to t\bar{t}H$ | 12 | 2327 | **Phys. Lett. B571(2003)163** |
| $e^+e^- \to ZHH$ | 27 | 5417 | **Phys. Lett. B576(2003)152** |
| $e^+e^- \to e^+e^-H$ | 42 | 4470 | **hep-ph/0407065** |
| $e^+e^- \to \nu\bar{\nu}\gamma$ | 10 | 1099 | **Presented at ACAT03** |
| $e^+e^- \to \mu\bar{\nu}u\bar{d}$ | 44 | 6094 | **Presented at Loop&Legs(preliminary results)** |
| $e^+e^- \to \nu\bar{\nu}HH$ | 81 | 19638 | **Presented at ECFA2004(Durham)** |

# Hadron collider Physics

Feynman Diagram for LHC




## Feynman@Home

Distributed Public Computing (SETI):

+

Distributed Private Computing ( Cluster, GRID)

By the people … For the people

Huge CPU available (100 000 systems)

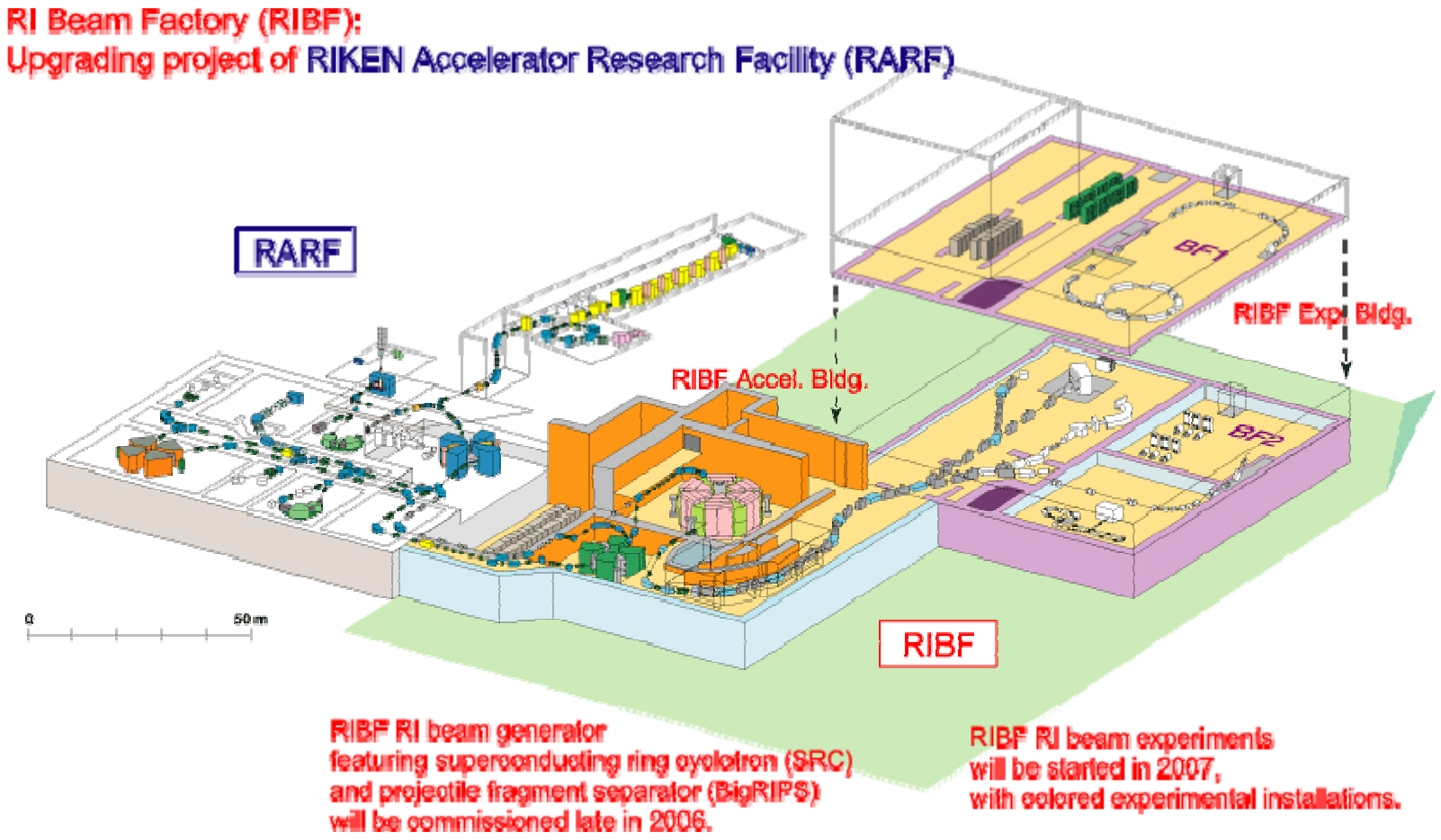
Important Outreach

# Nuclear Physics

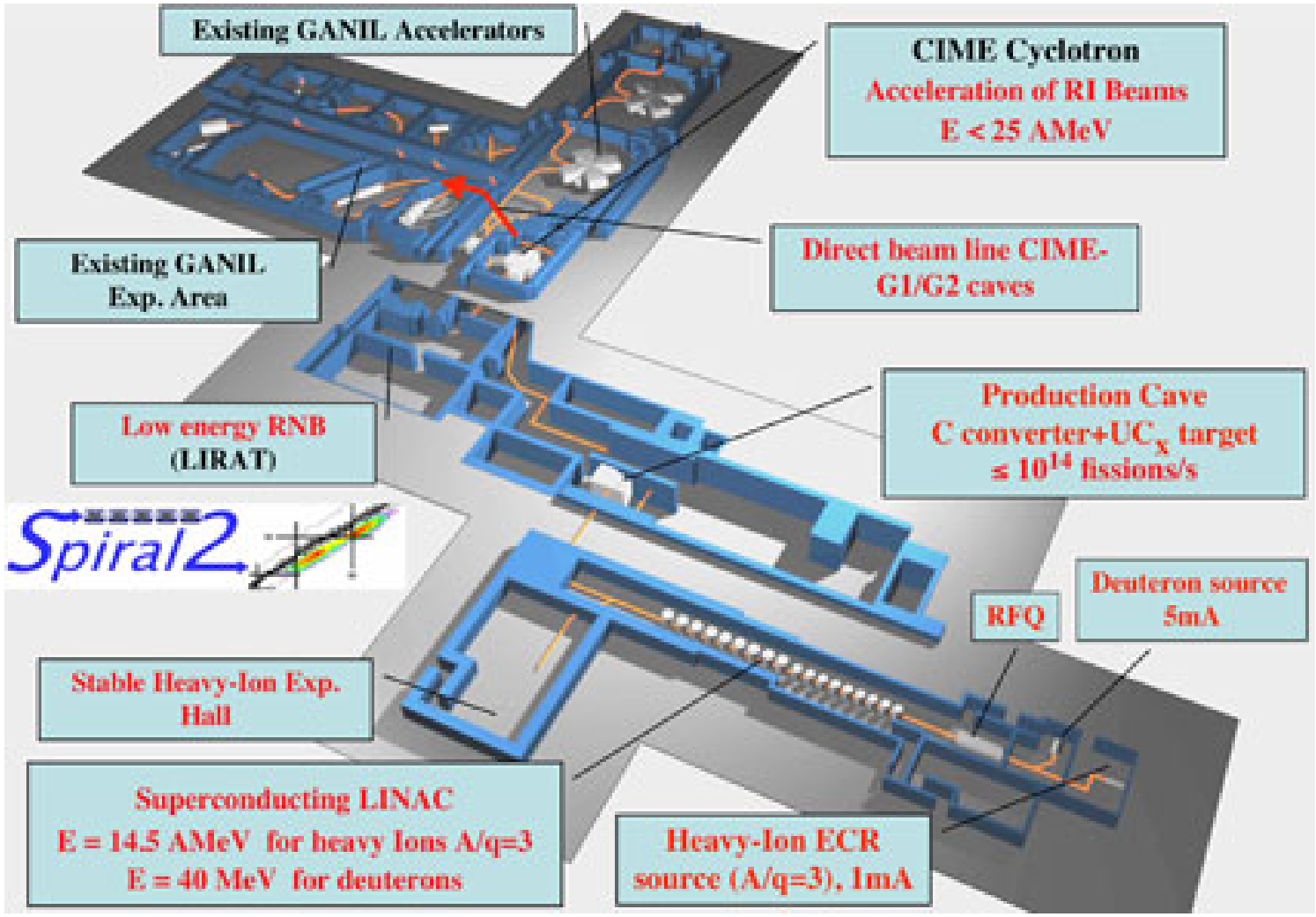
- MOU with RCNP-Osaka University:
  - Polarized Hydrogen-deuterium target developed at IPN (Orsay) for ESRF to be used at “Spring-8”
  - Technology transfer

- AIL (Associated International Laboratory) GANIL-RIKEN
  - RIBF: Radioactive Isotope Beam Factory
  - Complementary RIBF-SPIRAL2 programs
  - To be prepared in 2006

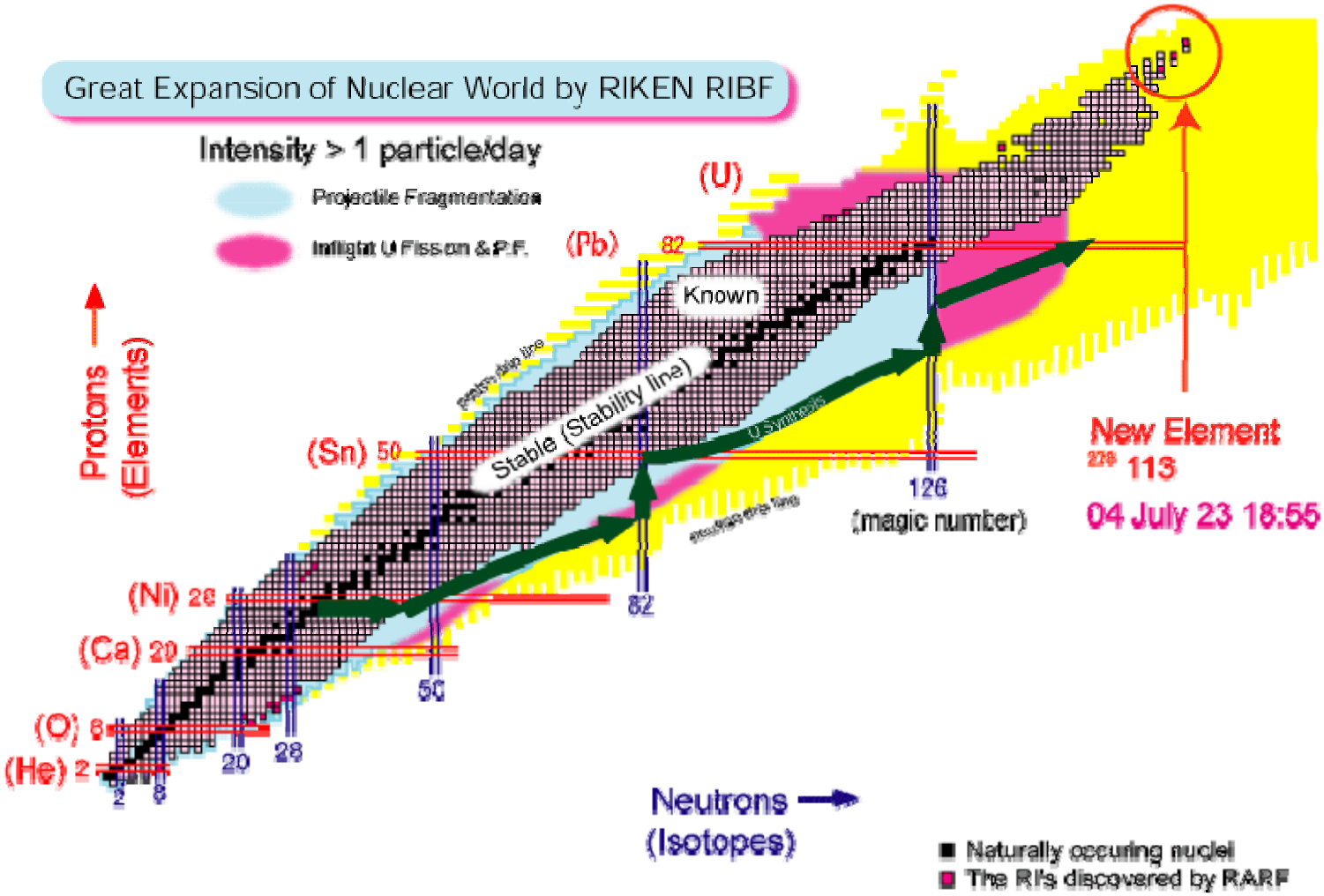
# RIBF at RIKEN



# Spiral2


Existing GANIL Accelerators
CIME Cyclotron
Acceleration of RI Beams
E < 25 AMeV
Existing GANIL
Exp. Area
Direct beam line CIME-
G1/G2 caves
Low energy RNB
(LIRAT)
Production Cave
C converter+UC$_x$ target
≤ 10$^{14}$ fissions/s
Spiral2
RFQ
Deuteron source
5mA
Stable Heavy-Ion Exp.
Hall
Superconducting LINAC
E = 14.5 AMeV for heavy Ions A/q=3
E = 40 MeV for deuterons
Heavy-Ion ECR
source (A/q=3), 1mA

# Nuclear Physics



# IT GRID Computing

CNRS-JST program
STIC-IN2P3

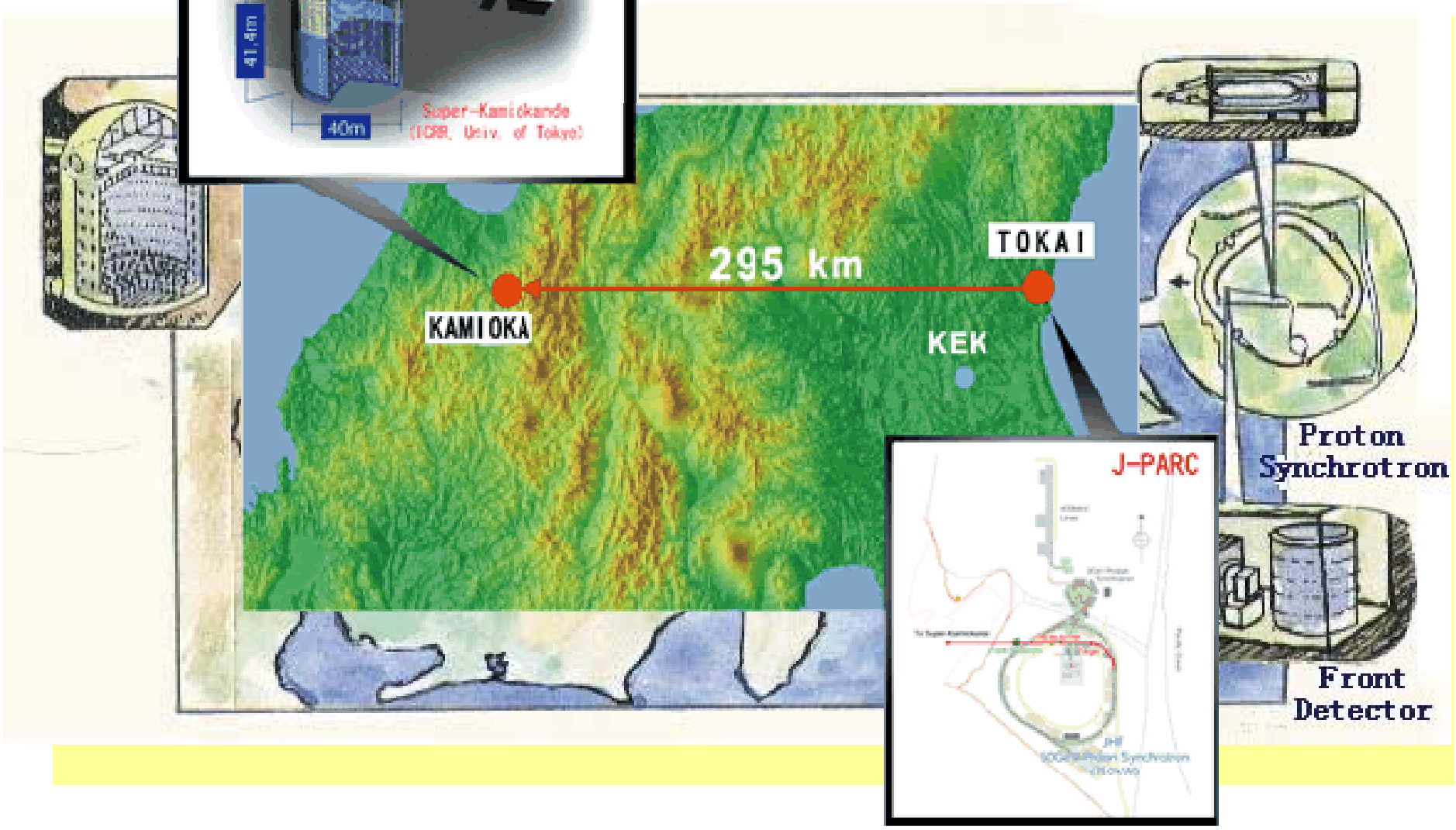
**NEGST (NExt Grid Systems and Techniques):**
**Interoperability and advanced technologies of Grid computing**

21 French, 16 Japanese Researchers

1) Instant Grid and virtualization of grid computing resources,
2) Grid Metrics
3) Grid Interoperability and Applications.
4) The French Grid5000 project and NAREGI as demonstrator


BTW: Super Computer Project in Japan 2010
- 10 Petaflops, 73 faster than current Top 1
- 700 M€
- Specific chips …

# Particle Physics



# AIL (LIA) Particle Physics

IN2P3-CNRS DAPNIA-CEA
KEK

A Joint CNRS-CEA-KEK project

**Objectives:**

- *Bringing together the French-Japanese Particle-Physics communities.*
- *Developing a Particle Physics European-Asian axis*
- *Building the basis for the first Global Scientific Project (ILC)*

A collaborative network of host laboratories:

CNRS-IN2P3:
**LAPP (Annecy),**
**LLR (Palaiseau)**
**LPNHE (Paris),**
**LAL (Orsay),**

CEA
**DAPNIA (Saclay),**

Japan
**KEK (Tsukuba).**

7 main topics: ~ 25 Collaboration Proposals

- Detector R&D (ILC, B-Physics, ...)
- LHC (CERN, Grid)
- B-Physics and Super B Factory
- Neutrino Physics (T2K, Opera, ...)
- Simulation, event generators and data Analysis
- Computing (GRID, Geant4, HPNC, Lattice QCD)
- ILC accelerator R&D

# Wiki Web page

Jump:

FJHEPL

Edit PowerEdit Attach Printable PDF/Latex PDF (testing) FJHEPL.WebHome r1.17 - 18 Nov 2005 - 15:12 - DenisPerretGallix topic end

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France-(CNRS-CEA: LAPP, LLR, LPNHE, LAL, DAPNIA); Japan-KEK

## France Japan ILC-LHC and Particle Physics Laboratory

(FJ ILC-LHC PPL)

### Introduction

Welcome to the home of **TWiki.FJHEPL**. This is the France Japan ILC-LHC and Particle Physics Laboratory FJ ILC-LHC PPL web site. As this project is in preparation, the information is restricted to members only, get registred (TWikiRegistration) and go to FJ ILC-LHC PPL Intranet

This web page is updated by the collaboration members (TWikiRegistration) If you have never used a Wiki before, you should visit WelcomeGuest, and have a look at the TWikiTutorial. *Please feel free to correct any mistakes, and to add new information (using GoodStyle of course)!*

- Project presentation - Short description of the project
- Run it? - Programs you can run
- Publications? - Publications from collaboration members and others
- Presentations and notes? - Talks and notes
- FJPPL Links? - Links to teams and laboratories web pages
- Collaboration Members?
- Download zone? -
- FJ ILC-LHC PPL Intranet - The Twiki FJPPL web for members only

### Comments are welcome:

**Monthly Top Contributors (more)**

3 DenisPerretGallix

**Interaction.org news**

**FJPPL News - More? Note:** Included topic FJPPLNewsHeadlines? does not exist yet

**Conferences - More? Note:** Included topic FJPPLConferencesHeadlines? does not exist yet

November 2005

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December

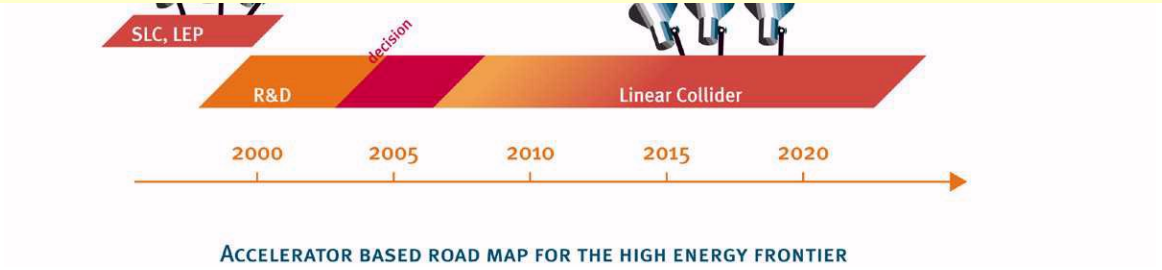
# The Linear Collider Project
# e+e-

**After LHC Discoveries:**
**High Precision Physics with a Linear collider**
**The first Global Science Project**

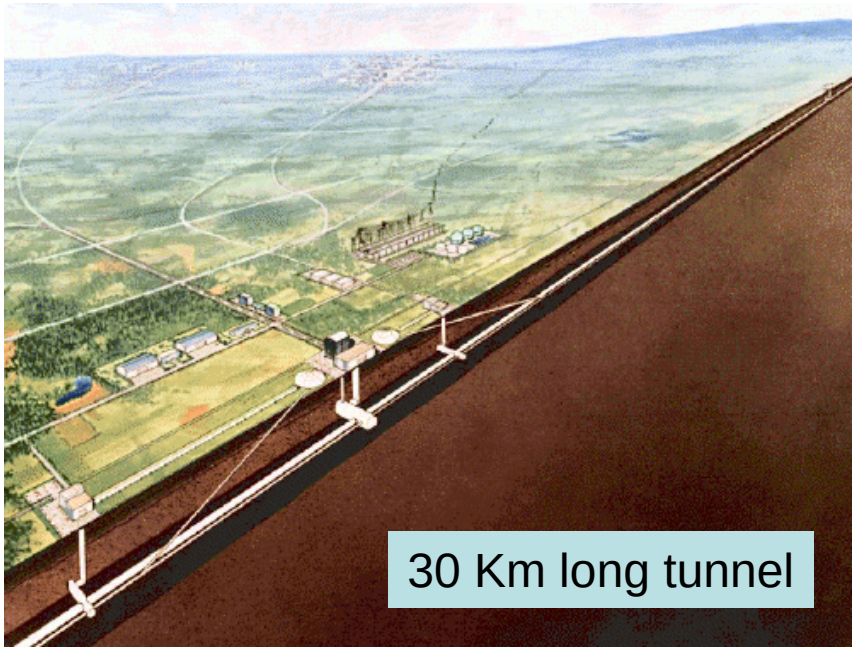

How to get a global agreement?

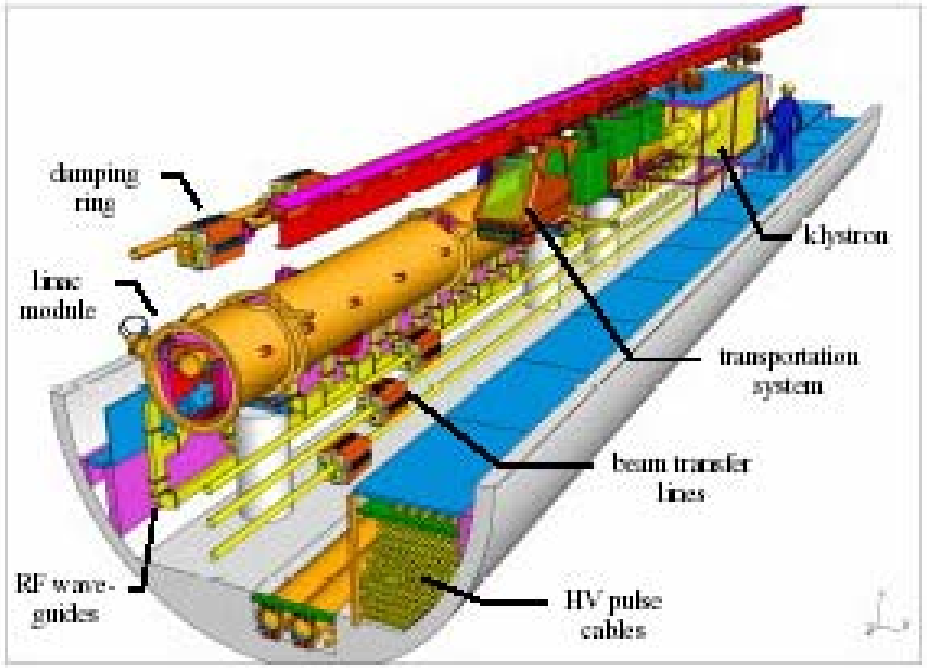
Project Approval Road Map

One of the issue of the “Particle Physics” IAL



# Linear Collider Project




6 Mds Euros