

Brazilian Groups @ LHC Collaborations

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Introduction

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 - ★ Cosmic Rays - since the 30's
 - ★ Accelerators - [CERN](#) and Fermilab

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- Latin America-CERN agreements
 - ★ CERN signed agreements with Argentina, Brazil, Chile, Colombia, Ecuador, Mexico and Peru.
 - ★ Agreements with Cuba and Venezuela are in the pipeline.

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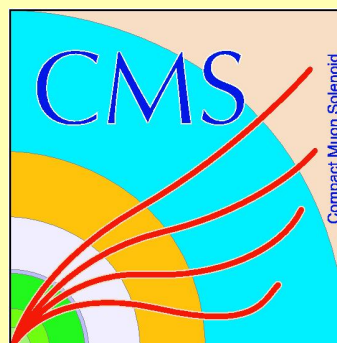
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 - ★ CERN signed agreements with Argentina, Brazil, Chile, Colombia, Ecuador, Mexico and Peru.
 - ★ Agreements with Cuba and Venezuela are in the pipeline.
 - ★ Latin American countries that have signed agreement with a LHC experiment: Brazil, Cuba and Mexico.
 - ★ Brazil(CNPq)/CERN umbrella agreement was signed in the 80's and was not renewed since 2000!

Brazil @ CERN

- Brazilian activities at CERN:
 - ★ LNLS - Campinas
 - ★ Fixed Target Experiments (ATHENA)
 - ★ LEP - DELPHI - CBPF, PUC-RJ, UERJ and UFRJ

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 - ★ LEP - **DELPHI** - CBPF, PUC-RJ, UERJ and UFRJ
 - ★ **LHC**



Conclusions

- Brazilian groups have a very fruitful participation in CERN collaborations during the last 15 years.
 - ★ Important Physics results
 - ★ Technology transfer
 - ★ Human Resources

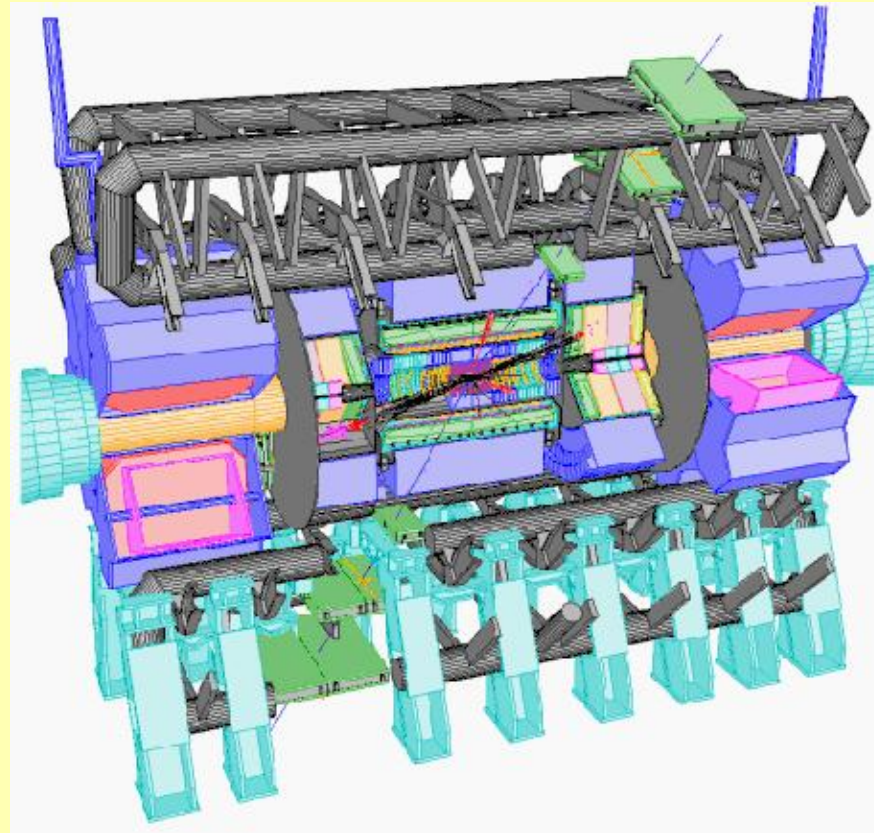
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- There are two problems that can exclude Brazilian groups from CERN collaborations
 - ★ Brazilian government should make a clear decision about supporting and funding the groups

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 - ★ Important Physics results
 - ★ Technology transfer
 - ★ Human Resources
- There are two problems that can exclude Brazilian groups from CERN collaborations
 - ★ Brazilian government should make a clear decision about supporting and funding the groups
 - ★ To have access to science and technology development third world countries need, at least, good Internet connection.

A Toroidal LHC Aparatus



- A group from UFRJ joined ATLAS in 1988. IRD, IEAV, CBPF, UFJF and UFSJ may contribute.

The only signed agreement between CNPq and a LHC experiment is the ATLAS MoU (1999).

ATLAS - Continued

- Physics

Search for new heavy leptons and new gauge bosons and study of top quark related channels.

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- Projects

- ★ TileCal prototype development.
- ★ Construction and test of electronic cards for the hadron trigger.
- ★ Trigger algorithm.
- ★ Computing projects.
 - * Data analysis tools
 - * TileCal quality checking

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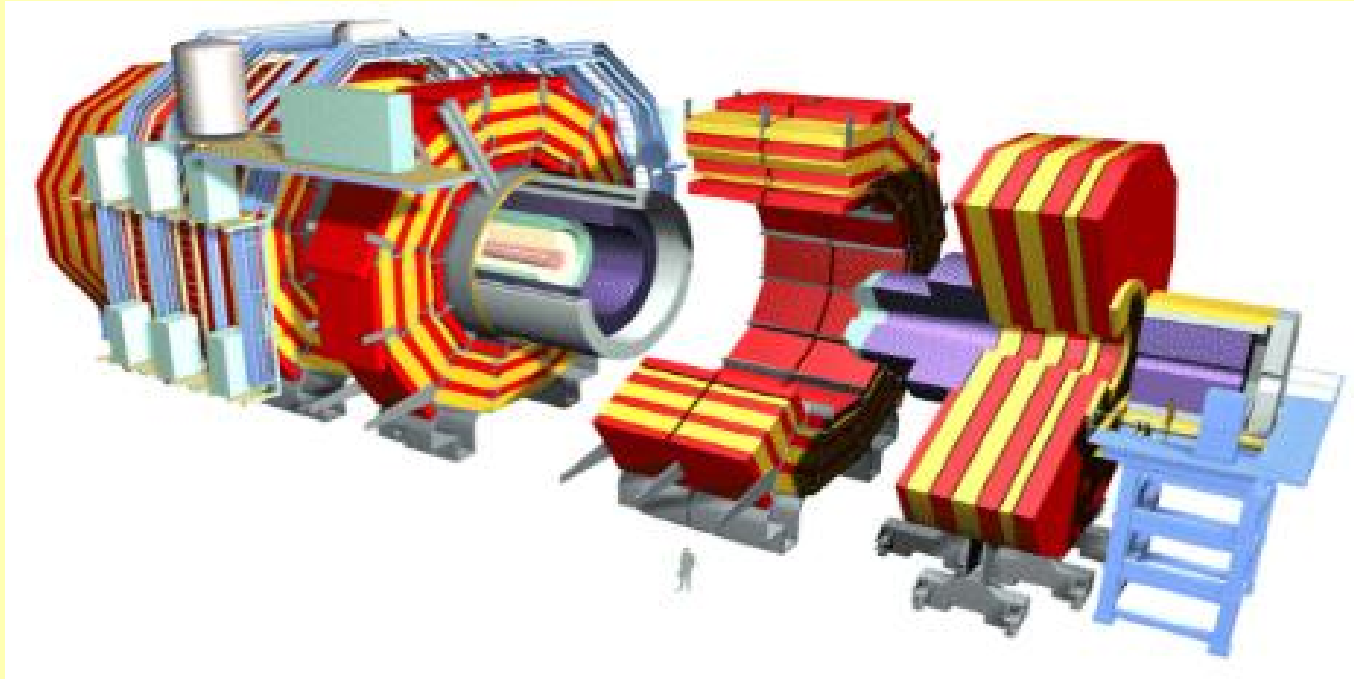
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- Problems

- ★ **CNPq does not respect the terms of the signed agreement.**
- ★ The bandwidth of the connection to CERN (≈ 100 Mbps) is not enough for the development of the computing projects.

The Compact Muon Solenoid



- HEPCMS-Brazil is a consortium constituted by researches from 7 Brazilian Institutions (UERJ, UFRJ, UFBA, UNESP, USP, UFRGS and CBPF).

The group still have commitment with **D0** but two institutions already joined CMS (2002).

CMS - Continued

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 - ★ Mount a GRID T1-T2 to contribute to several CMS projects.
A local T2 is starting to work, in collaboration with CALTECH.

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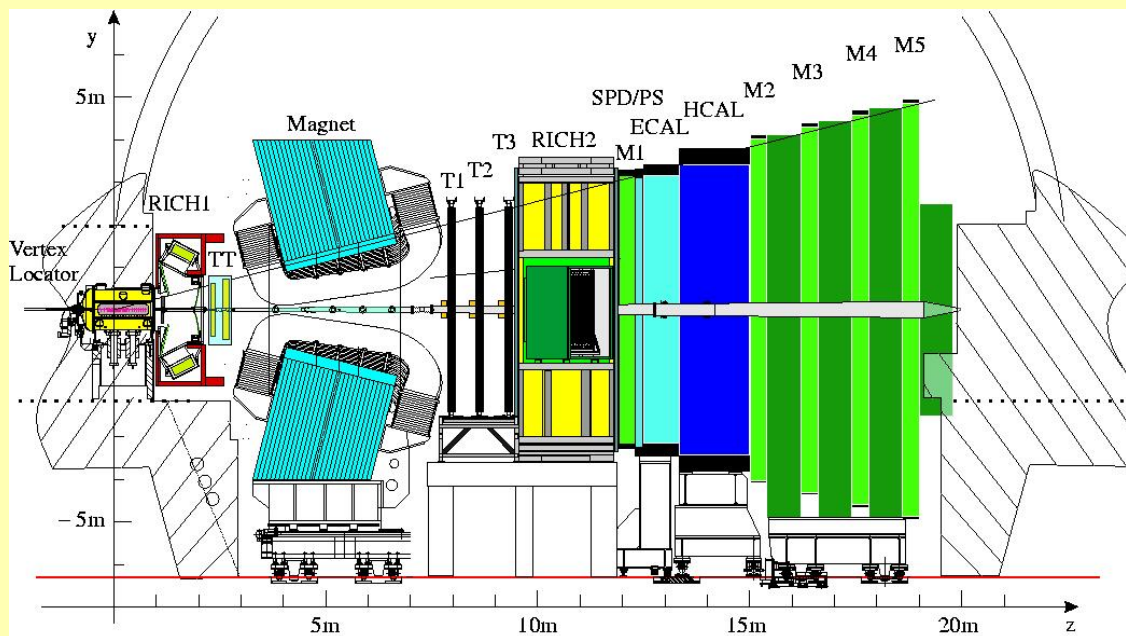
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- Problems
 - ★ Government has not yet taken the decision of signing agreements with CERN and CMS.
 - ★ UERJ has a bad Internet link (≈ 10 Mbps).

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The Large Hadron Collider beauty Experiment



- After a workshop organized by CNPq in 1998 at the Brazilian Academy of Science two institutes joined the LHCb collaboration - UFRJ and CBPF. CEFET-RJ was an Associated Laboratory.

Two PhD and one MSc were concluded, three PhD and two MSc are under development.

The '01 collaboration meeting outside CERN was in Brazil

LHCb - Continued

- Physics

The group had contributed to the TDRs doing studies about LHCb sensitivity to measure β and γ angles of CKM triangle and to observe rare decays ($B_s \rightarrow \mu\mu$ and $B_d \rightarrow llK^*$)

- Projects

- ★ Detector construction and test
- ★ Front end electronics ([CARIOCA](#))

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Prototype



CERN and Rio Current Amplifier



Test Station

LHCb - Continued

- ★ Development of analysis tools (Da Vinci)
- ★ Particle ID
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- Problems
 - ★ Many projects have been submitted to CNPq and FAPERJ since 98, when the collaboration was encouraged by the funding agencies. None were supported.
 - ★ There is no signed agreement between Brazil and LHCb
 - ★ To work in HEPGRID projects it is necessary to sign agreements!
 - ★ A bandwidth of \approx Gbps is needed, but the UFRJ network does not support more than \approx 100 Mbps.

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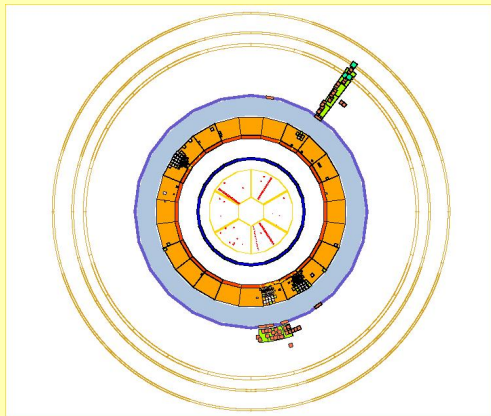
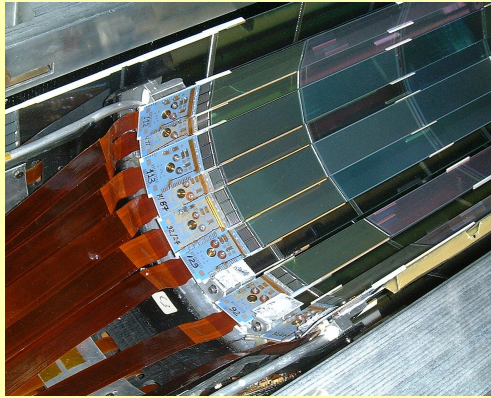
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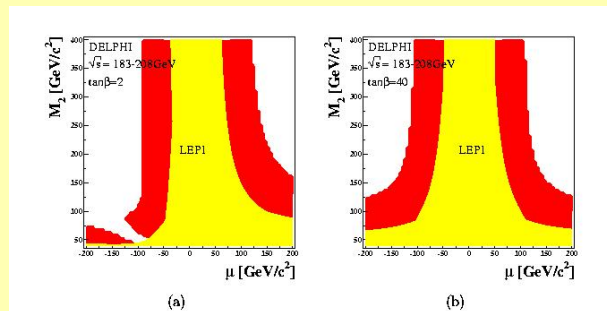
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DELPHI



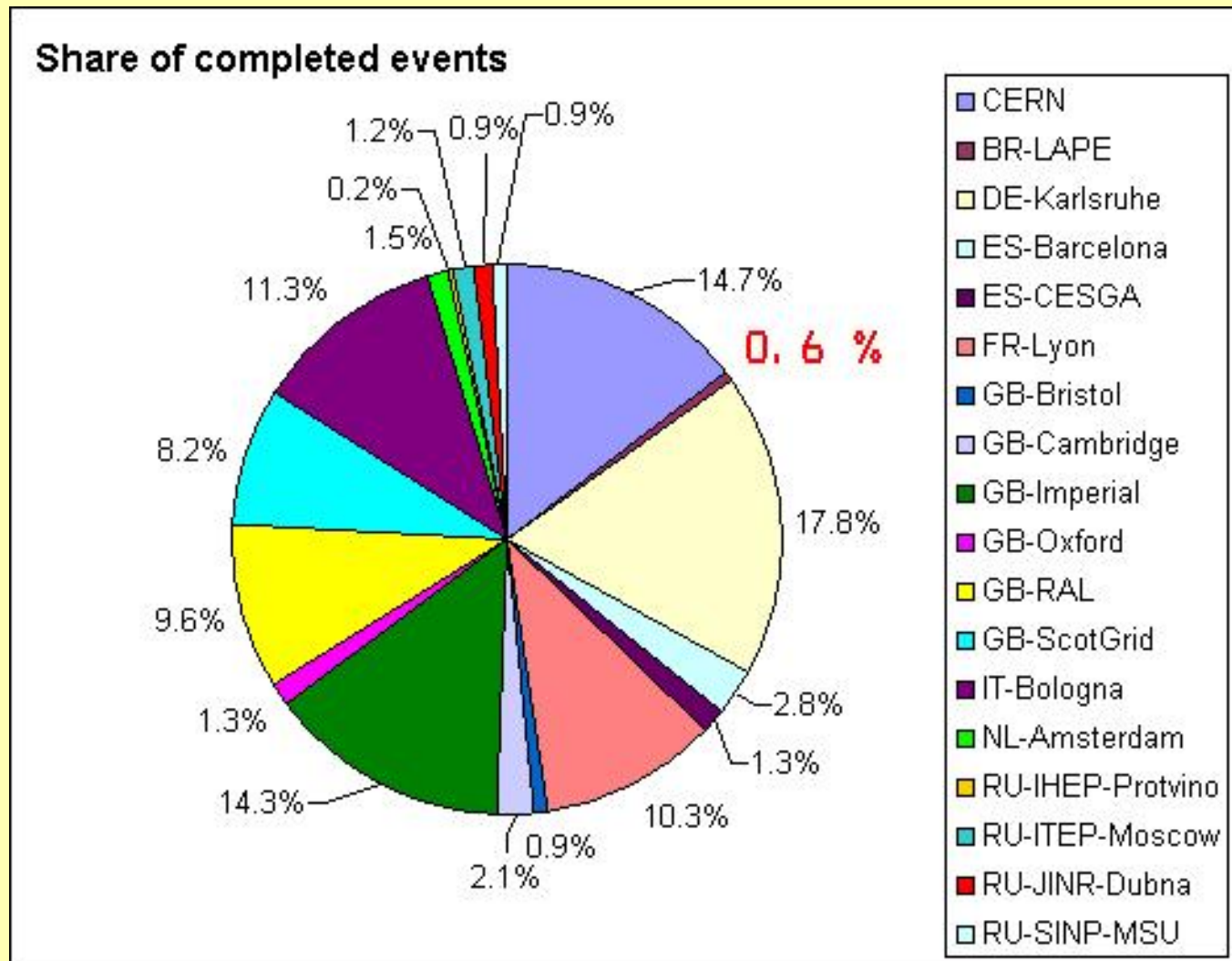
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Summer 2003



Monte Carlo Production of 4.7×10^7 events for TDR studies



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