

The White Rabbit Collaboration

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Workshop synchronisation de précision et réseaux

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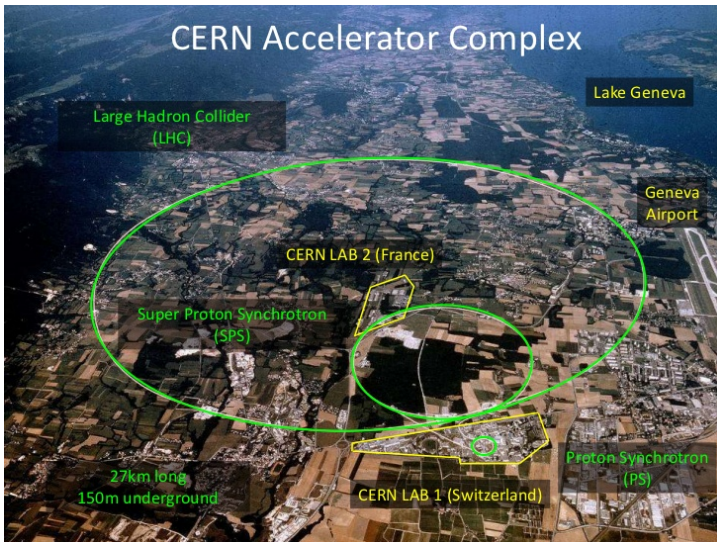
Outline

- 1 Introduction to CERN
- 2 White Rabbit
- 3 Community
- 4 The White Rabbit Collaboration
- 5 Plans

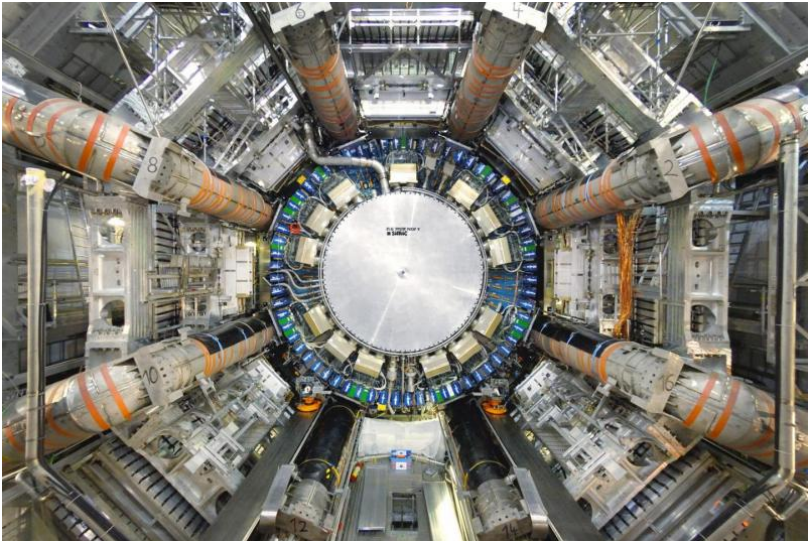
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Accelerators



Detectors



Dissemination



How to interpret one's dissemination mandate in the 21st century

Free and Open Source Software

Open Hardware

Open Data

Open Access

World Wide Web

INSPIRE

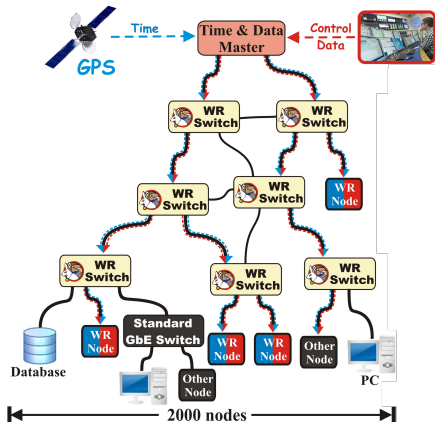
An Updated Historical Profile of the Higgs Boson

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What is White Rabbit?

- Initially meant for Big Physics facilities/projects: CERN, GSI, Nikhef. . .
- **Based on well-established standards**
 - Ethernet (IEEE 802.3)
 - Bridged Local Area Network (IEEE 802.1Q)
 - Precision Time Protocol (IEEE 1588)
- **Extends standards** to meet new requirements and provides
 - Sub-ns synchronisation
 - Deterministic data transfer
- Initial specs: links ≤ 10 km & ≤ 2000 nodes
- **Open source and commercially available**



Open and commercially available off-the-shelf

WR Switch

Seven Sol, Spain
Creotech, Poland



OPNT, Netherlands
SyncTechnology,
China

Simple VME FMC carrier (SVEC)

Janz Tec AG,
Germany



Simple PCIe FMC carrier (SPEC)

Creotech, Poland
INCAA, Netherlands
Seven Solutions, Spain
ISD S.A., Greece

Compact Universal Timing Endpoint (Cute-WR-DP)

SynTech, China



Digitizers

Struck, Germany
SP Devices, Sweden



GPS Disciplined Oscillator

Seven Solutions, Spain

ZEN TP-32 BNC

Seven Solutions, Spain



PXI module

Sundance,
UK



Companies selling White Rabbit:

www.ohwr.org/projects/white-rabbit/wiki/wrcompanies

White Rabbit technology - sub-ns synchronisation

Based on

- IEEE 1588 Precision Time Protocol on Gigabit Ethernet over fibre

White Rabbit technology - sub-ns synchronisation

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Enhanced with

- Layer 1 syntonisation
- Digital Dual Mixer Time Difference (DDMTD)
- Link delay model

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Short history of WR

- 2008: first meeting at CERN
- 2009: first switch prototype
- 2012: first COTS switch available (open-source hardware, gateware, firmware, software)
- 2012: first operational deployment of WR (Gran Sasso National Lab)
- 2013-2018: WR concepts standardised within IEEE 1588
- 2024: creation of the WR Collaboration (see [launch event](#))

WR post-standardisation



A technology supported by a friendly community working on a fully open-source implementation of IEEE 1588-2019 High-Accuracy (HA) profile, with a guaranteed sub-nanosecond accuracy

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Entering a new phase

Post-standardisation issues

- How to maintain good support after the increase in uptake of the technology, both in industry and academia?
- How to ensure a high level of quality in the foundations of WR (switch and WR PTP core)?

The White Rabbit Collaboration in a nutshell

Ensuring sustainability

- Members pay a yearly fee and shape the future of the technology
- Fees are used to pay the WR Collaboration Bureau, which offers support (including training) and ensures WRS and WRPC are always in good health

The White Rabbit Collaboration in a nutshell

Letting information flow

- Collaboration with vendors ensures coherent growth of the WR ecosystem
- Keeping members well informed: online presentations, forum, regular meetings. . .
- Connecting people, institutes, companies (e.g. connecting NRENs with industry)

The White Rabbit Collaboration in a nutshell

Ensuring high-quality

- Making the evolution of WRS and WRPC the main task of the Bureau
- Teaming up with laboratories to establish a set of tests and qualification criteria
- Connecting the use of the WRC logo to the successful passing of those tests