

PACMAN PROJECT IN FIGURES

4 years project

10 PhD students

8 universities & laboratories partners

8 industrial partners

From 13 Countries

FEATURES

Collaboration

Mobility

High quality training

Science promotion

Diversity

Women in science

Knowledge transfer

Career development

THE WORK PACKAGES

WP1 Metrology & Alignment

WP2 Magnetic Measurements

WP3 Precision mechanics & nano-positioning

WP4 Microwave technology

IMPACT

Train young researchers in topics of interest for European industry

Improve the career prospects and employability of the researchers

Stimulate creativity and entrepreneurial mindsets in the next generation of scientists

Enhance public and private research collaboration

Disseminate the results in the private and public sector and Science outreach. Promoting science to the general public

Strengthen the links between partners working on metrology, high accuracy alignment, nano-positioning, precision mechanics, microwave technologies, magnetic measurements

Develop new high-tech solutions to be applied not only on future particle accelerators at CERN or elsewhere but also in fields such as medical physics and technology, instrumentation, telecommunication, aerospace or nanotechnologies

Promote science and women in science, enhance the participation and the role of women in research laboratories, universities and industries



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PACMAN Particle Accelerator Components' Metrology and Alignment to the Nanometre scale

Main aim: improve the accuracy of alignment for the components to be installed in the next generation of particle accelerators.

PACMAN is an Innovative Doctoral Program Network, offering training to 10 Early Stage Researchers hosted by CERN thanks to The European Commission's FP7 Marie Curie Actions.

The human objective of the Marie Curie program is to create a new generation of scientists equipped with a wide-ranging expertise in advanced engineering and instrumentation.

The technical objective of the PACMAN project is to develop very high accuracy metrology and alignment tools and validate them in a single automatic test stand integrating all of them.

This multidisciplinary research project strengthens the co-operation between the most innovative universities, laboratories and industries of Europe in these fields.

BACKGROUND

The next generation of particle accelerators will produce a high number of collisions at very high energy or generate the brightest light from light sources. This will require very tight tolerances concerning the position of the components focusing, accelerating or detecting the beam all along the accelerator.

These objects are large and heavy, weighting sometimes more than 100 kg and measuring 1m in length or more. They will have to be aligned to within a few microns over a distance of several hundreds of metres.

The current state of the art consists of a succession of independent steps that are costly, lengthy and add systematic and random errors at each step.

SCIENTIFIC GOAL

PACMAN proposes an alternative solution for a high accuracy alignment of the accelerator components, integrating all the alignment steps in one, with a large number of technologies at the same time and location, in order to gain the required precision and accuracy.

A significant number of issues need to be tackled to solve this goal: methods for magnetic measurements to determine the functional axis of magnets of very small aperture need to be developed; new methods to determine the electromagnetic centre of microwave cavities must be proposed; static and portable methods of absolute alignment must be developed; the components will have to be positioned using a nano-positioning system; and seismic sensor must be developed that are compatible with magnetic fields to characterize the environment.

PACMAN NETWORK

CERN, CH
Cranfield University, UK
Delft University of Technology, NL
ETH Zürich, CH
IFIC,ES
LAPP, FR
University of Sannio, IT
SYMME, FR
University of Pisa, IT
DMP, ES
ELTOS, IT
ETALON, DE
Hexagon Metrology, DE
METROLAB, CH
National Instruments, HU
SIGMAPHI, FR
TNO, NL

