



# Advanced Control Engineering

## CERN – IFAC/CEA

### Introduction

EN/ICE Automation Seminars  
CERN, 2<sup>nd</sup>, 3<sup>rd</sup> June 2014



# EN/ICE Automation Seminars

Spread out knowledge in Automation at CERN

- Past Seminars
  - Industrial Communications (2)
    - EtherCAT (M. Rostan, EtherCAT)
    - Profinet (W. Schroeder, SIEMENS)
  - PID control
    - Prof. Cesar de Prada, UVA

<https://indico.cern.ch/category/4856/>

# Workshop goal



- IFAC/CEA and the Control Engineering group action:  
**Industry day 3<sup>rd</sup> edition**
  - Get closer to the real use of control engineering in industry (e.g. Petroleum refinery, thermoplastics)
- **Exchange Academia – Industry knowledge**
  - Existing CERN projects involving advanced control engineering
  - Lectures focused on some CEA members research topics

IFAC: International Federation of Automatic Control

# Overview

(<https://indico.cern.ch/event/303961>)



## Advanced Control Engineering: Academia - Industry

2-3 June 2014

 

CERN  
Europe/Zurich timezone

CERN - IFAC (CEA)

Overview

Timetable

Contribution List

Registration

... [Modify my Registration](#)

Video Services

*The group **EN/ICE** (Industrial Control) at CERN, in a search of continuous improving the automatic control methodologies used at CERN, organizes this workshop about control engineering in industry.*

A challenge between academia and industry is to fill the gap between theory and practice when dealing with complex control systems. Most of the times, the emerging algorithms coming from Academia find barriers to be introduced in industry. This is due to several factors as the complexity of the solution against benefits does not justify the investment, not practical implementation in the real plants or reluctance of industry to deploy new approaches among others.

However in the latest years, Academia has shown a special interest to get closer to industry and try to understand and answer real industrial issues. Within this context, the workshop will focus in getting a flavour of technologies and real examples by a bidirectional exchange of:

- (1) real use cases of advanced control made at CERN
- (2) a series of control seminars about technologies well developed in Academia which could find their implementation at CERN.

In this occasion Academia will be represented by members of the Spanish Committee (**CEA**) of the International Federation of Automatic Control (**IFAC**).



# IFAC/CEA visitors

Universidad  
de Oviedo

Universidad  
de Leon

Universidad  
de Valladolid

Universidad  
de Sevilla

Universidad  
de Huelva



Universidad  
Autónoma  
de Barcelona

Universidad  
Politécnica  
de Valencia

# Programme

- Two sessions:
  - 2<sup>nd</sup> June: CERN use cases
  - 3<sup>rd</sup> June: IFAC/CEA lectures

# CERN use cases

- **CERN industrial control**  
*Ph.D. Philippe Gayet*
- **Model-Based Predictive Control applied to the LHC magnets temperature control**  
*Ph.D. Enrique Blanco*
- **High precision current control of the LHC Power Converters**  
*Hugues Thiesen*
- **Control and simulation of cryogenic plants at CERN**  
*Ph.D. Benjamin Bradu*
- **Design and performance of the LHC beam-based feedback systems**  
*Ph.D. Ralph Steinhagen*
- **Formal methods applied to PLC code verification**  
*Borja Fernandez Adiego*

# IFAC/CEA lectures

- **Recent advances in PI/PID tuning**
  - *Ph.D. Ramon Vilanova (UAB)*
- **Overview of Model Predictive Control**
  - *Prof. Cesar de Prada (UVA)*
- **Multi-objective optimization for engineering design**
  - *Ph.D. Xavier Blasco (UPV)*
- **A Visual Analytics approach for process analysis**
  - *Ph.D. Ignacio Diaz Blanco (UOVI)*





[www.cern.ch](http://www.cern.ch)