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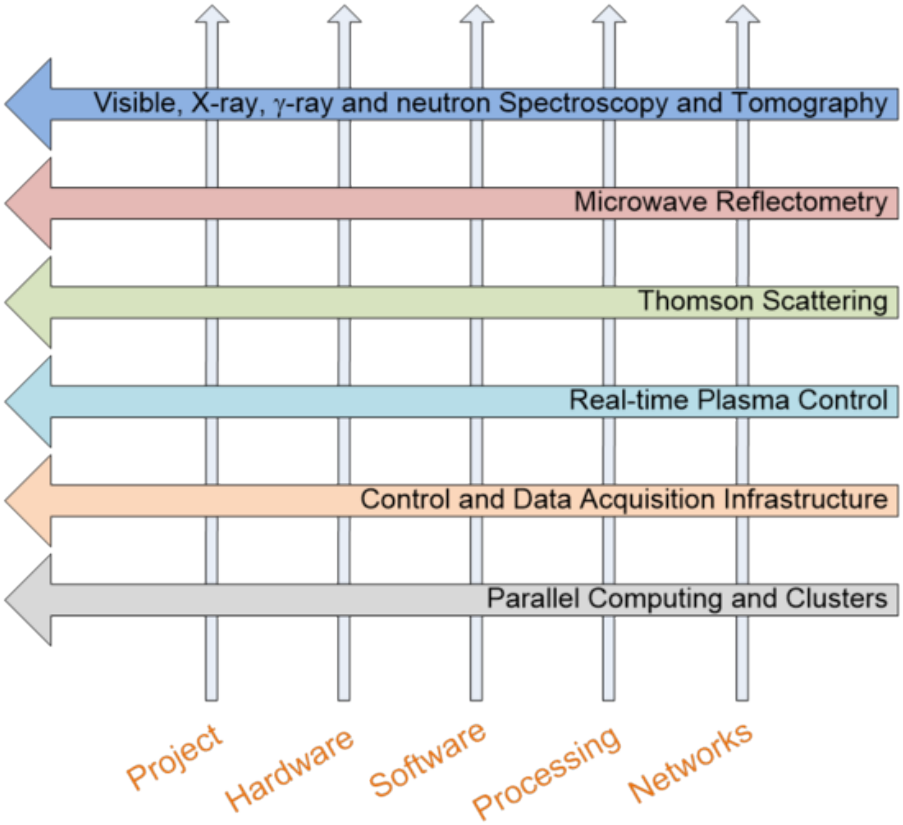
Activities of the C&DAQ group

The Control and Data Acquisition group activities result from a collaborative effort between the various vertical engineering competencies on Instrumentation, applied to various fusion/physics areas.



Activities are mainly focused in:

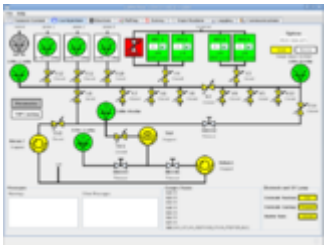
- The specification and development of CODAC* systems and components;
- Development of CODAC instrumentation hardware/firmware.
- The development of operation, monitoring, data flow and algorithm codes for CODAC, diagnostics and plasma control systems;
- Real-time/parallel data acquisition and processing;
- Timing, synchronization, event management and data transport networks;
- Collaboration on the development of international instrumentation standards;
- Establishment of International Strategic Partnerships with the Industry;
- Inform the Portuguese industry of fusion CODAC projects;
- Inbound and outbound education and training activities;
- Improving the laboratorial and work-shop infra-structures.

The main R&D outcome is measurement Instrumentation systems aiming at:

- Focused performance

- Reliability and availability
- Low-cost
- State-of-the-art componentes



Collaborations with Fusion Laboratories

JET-EFDA	Joint European Torus - European Fusion Development Agreement	United Kingdom	
ITER	IO F4E	Cadarache Barcelona	
CRPP	Centre de Recherches en Physique des Plasmas	Switzerland	TCV
IPP.CR	Institute of Plasma Physics	Check Republic	COMPASS
RFX	Consorzio RFX	Italy	RFX
IPP	Max-Planck- Institut für PlasmaPhysik	Germany	W7-X, ASDEX-Upgrade
CIEMAT	Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas	Spain	TJII
USP	Instituto de Física da Universidade de São Paulo	Brazil	TCA/Br
INPE	Instituto Nacional de Pesquisas Espaciais	Brazil	ETE

Recent Agreements

ITER: FPSC – Fast Plant System Controller prototype.

F4E

- F4E-FPA-375 – Plasma Position Reflectometry
- F4E-FPA-327 – Radial Neutron Camera (RNC) and Radial Gamma-Ray Spectrometer (RGRS)
- F4E-OPE-442 – Design and Performance Assessment of Integral and Proportional Data Acquisition Electronics for Real-time Acquisition

JET

- Gamma Ray Spectrometer Upgrade (GSU), Lost Alpha Particles Monitor (LRM) and Gamma Ray Camera Upgrade (GCU)
- DNG-G - Data acquisitionfor the neutron camera diagnostics enhancements.
- GRS - Data acquisitionfor gamma spectroscopy.
- PCU-VS - ATCA hardware platform for the Plasma Control Upgrade project.
- RTMC - Real-Time Measurement & Control Diagnostics & Infrastructure
- TOFOR - Time-of-FlightNeutron Spectrometer Optimized for high count Rate.
- MPRu- magnetic proton recoil neutron spectrometer.
- Reflectometry measurements- X-mode reflectometry.

COMPASS

- Plasma control and CODAC hardware/software infrastructure
- Gas Injection, Baking, Vacuum and Puffing control system software

IPP: IPP-ICRH-REFLEC, W7-X CODAC digitizers

RFX: Digitizersfor Plasma Positioning

Manpower and Resources

- Currently, the group is composed of 6 Researchers, 4 Junior Researchers and 1 Technician.
- Most of R&D work happens in-house, only a fraction of the manpower is used for commissioning and R&D tasks on international experiments.
- In-house prototyping and testing.

Collaboration with the industry

- Discussions have been held with international companies
  - Potential collaborations towards ITER
  - Licensing IPFN control & data acquisition systems
  - Co-development of control & data acquisition solutions
- IPFN is trying to improve the collaboration with national industry

Strategy

- Continue collaborations with ITER and other fusion experiments.
- Enlarge the scope of activities to other physics experiments, local or international.
- Establish definite paths for:
  - IP transfer to Industry
  - Outsourcing from Industry
- Improve efficiency of Project activities:
  - Continue R&D of a unified platform of Instrumentation able to cover a large scope of applications in Physics.
  - Establish clear boundaries between Academic activities and Project activities.
- Continue the development of critical components:
  - xTCA hardware, Real-time MARTe framework, EPICS machine control, High-speed codes and algorithms for FPGAs, High-performance networks for database access, real-time processing and synchronization.

*CODAC: COntrol, Data Acquisition and Communications.

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