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Name	Degree	% participation
Rita Jorge de Sousa Costa Pereira	fellow with master	100%

Part I – Scientific Activities

Further Development of a data acquisition system (DAQ) for the DNGG project - 19 Neutron cameras/ Gamma-ray detectors (KN3) in behalf JET-EP2 diagnostics:

1. Replicate at JET the tests performed at IST - The following setup was used: two radioactive sources (^{137}Cs and ^{60}Co), an ORTEC Shaping Amplifier (ORTEC 667), an ATCA digitizer module, and the detector feed and biased with (i) batteries and (ii) filtered ORTEC rear PSU. As expected the best spectrum was achieved with batteries (Direct method acquisition (without ORTEC shaping amplifier) 8.89% versus ORTEC amplifier ~9.33% for 662 keV ^{137}Cs). Using the ORTEC rear PSU, the results confirm the necessity of a low pass filter near detector to obtain the spectrum at lower energies. When the filter was far from detector (tests with 7 and 12 meters) the spectrum resolution get worst, either for direct method and ORTEC amplification method.
2. Calibrate 19 channels of the KN3G/FEB ATCA digitizers with signals coming from the cameras: a) using radioactive sources to build spectra. The vertical camera was in place and two channels available. 3 sources were used: ^{22}Na ; ^{137}Cs ; a movable AmBe. Due to the low activity of the ^{22}Na and ^{137}Cs , long acquisitions (20 min minimum) were required to build spectra. For that reason, the real time (RT) processing (storing the energy of the pulses plus the time stamp) was essential to achieve spectra. Two RT algorithms were tested: (i) the algorithm for Gaussian pulses, used with the 667 ORTEC amplifier; and (ii) the algorithm for exponential signals, used when signal comes directly from the detectors. The (ii) algorithm presents better results. However, due to a new noisy ringing embedding the low energy pulses, acquisitions were lowered from 50 MHz to 3.125MHz in order to achieve spectra at lower energies. The ringing is due to signal conditioning and cabling; b) Analyses of the Hard X-ray and Gamma-ray pulses acquired with the new KN3G data acquisition system during ICRH sessions (C28 campaigns). According to the obtained spectra the digitizers cover an energy range from 300 keV to 8 MeV in a single window.
3. Integration of the KN3G/FEB ATCA system to CODAS;
4. 2 TRP-400 modules for COMPASS were changed. Initially the modules were assembled to be AC coupled at the input channels, with minor changes the modules are now DC coupled.
5. Although the beginning of collaboration in the development of a data acquisition system dedicated to perform real time tomography at ESS-Bilbao was mentioned on the 2011 working program, there was no time available to start this new project.

Part II- Scientific Output

Papers in conference proceedings

Author(s)	R.C. Pereira, A.M. Fernandes, A. Neto, J. Sousa, C.A.F. Varandas, J. Cardoso, C.M.B.A. Correia, M. Tardocchi, M. Nocente, G. Gorini, V. Kiptily, B. Syme and M. Jennison
Paper title	Pulse analysis for gamma-ray diagnostics ATCA sub-systems of JET tokamak
Journal name	IEEE Transactions on Nuclear Science
Volume, page	Vol. 58, No 4, p. 1531-1537
Year	2011

Author(s)	A.M. Fernandes, R.C. Pereira, J. Sousa, A.J.N. Batista, A. Combo, B.B. Carvalho, C.M.B.A. Correia and C.A.F. Varandas
Paper title	HDL Based FPGA Interface Library for Data Acquisition and Multipurpose Real Time Algorithms
Journal name	IEEE Transactions on Nuclear Science
Volume, page	Vol. 58, No 4, p. 1526-1530
Year	2011

B. Publications and contributions in conferences and workshops - Posters

Conference	IAEA 8th Technical Meeting on Control, Data Acquisition and Remote Participation for Fusion Research
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Start-end date	20-24 June 2011
Location	San Francisco, California
Author(s)	A.M. Fernandes, R.C. Pereira, J. Sousa, B.B. Carvalho, J.M.F. dos Santos, V. Kiptily, C.M.B.A. Correia, C.A.F. Varandas and JET-EFDA Contributors
Poster title	Real Time Algorithms for Digital Pulse Processing applied to Gamma-Ray and Hard X-Ray Spectroscopy

D. Education and training

Doctorate thesis completed

Rita Jorge de Sousa Costa Pereira, “Instrumentação Baseada em ATCA Dedicada aos Diagnósticos de Espectroscopia Digital de Radiação Gama no JET”, "Instrumentation based on ATCA, for Gamma-ray Digital Spectroscopy Diagnostics", Universidade de Coimbra, September 2011, Supervised by Carlos Manuel Alexandre Bolota Correia and Jorge Rosa Lopes de Sousa.