

Project name

Participation in the following projects: Gamma camera Diagnostic Enhancement (DNGG) and JET Fast_Electron_Bremsstrahlung camera enhanced system (FEB)

Name	Degree	% participation
Ana Maria Gonçalves Fernandes	Fellow with Master	100%

Summary and highlights of research achievements

During 2011 year the main research achievements were:

i) Development and implementation of two RT algorithms in the FPGAs of the DNGG and FEB digitizer systems, two JET-EFDA diagnostics. The first algorithm is suitable for a Gaussian shaped pulse, when an external shaping amplifier is used between the detectors and the digitizers. The second algorithm is based on a double trapezoidal filter, it is suitable for raw exponential signals, and should be used when the data is acquired directly from the detectors.

ii) Development of the RT stream operation mode, to allow sending through the JET RT network the line-integrated emissions of the hard x-rays in RT, a goal for FEB project. The RT stream operation mode must operate simultaneously with the existing mode of raw/processed data storage in digitizer memories. The both modes operating simultaneously are under test at JET.

iii) Development and tests at JET of two software applications for data view and analyses. The first is a calibration software (Python graphical user interface) to calibrate in energies the 19th detectors of the DNGG/FEB diagnostics. The second is a private software (Octave script) to read the DNGG/FEB data, stored in JET database as LPF (late pulse file), and build spectra in JET computers (JAC).

iv) Calibration of the 19th DNGG/FEB channels using the RT algorithm at FPGAs to build the reference spectra for calibration slope.

iV) Participation in C28 JET campaign in a 1 month secondment agreement under FEB competence.

A. Publications - Papers in international refereed scientific journals

Author(s)	A. M. Fernandes, R. C. Pereira, J. Sousa, A. J. N. Batista, A. Combo, B. B. Carvalho, C. M. B. A. Correia, C. A. F. Varandas
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Paper title	HDL based FPGA interface library for data acquisition and multipurpose real time algorithm processing
Journal name	IEEE Transactions on Nuclear Science
Volume, page	vol. 58(4), pp. 1526-1530
Year	Aug. 2011

Author(s)	R. C. Pereira, A. M. Fernandes, A. Neto, J. Sousa, J. Cardoso, C. M. B. A. Correia, M. Tardocchi, M. Nocente, G. Gorini, V. Kiptily, B. Syme, M. Jennison and JET-EFDA contributors
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(4), pp. 1531-1537
Year	Aug. 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
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
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E. Distinctions and awards

A.M. Fernandes served as referee for Journal of Fusion Engineering and Design of one paper in the Eighth IAEA Technical Meeting (IAEA-TM) peer-reviewed special issue