List of 2015-2016 Competencies needed during MST1 Experimental Campaigns

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I. List of Competencies needed during MST1 Experimental Campaigns

In order to be successfully performed & analysed, the experiments and scientific tasks listed in Annex 2 need scientists with the competencies listed in section I.1 and I.2. There are two types of competencies:

- Competencies related to experiment and task analysis and modelling
- Competencies related to high level diagnostics analysis (for non-IPP/ non-EPFL diagnostics of AUG / TCV, respectively)

For these competencies you can propose stays at the AUG & TCV sites and weeks of work back in your home institution.

I.1. Competencies related to the analysis and modelling of experiments and tasks

Physics competencies are arranged by subject. Participation is expected in experiment preparation as well as execution and post-experiment analysis and/or modelling.
Competencies can be either as
-E: experimentalists, data analysis
-M: modellers, predictive and/or interpretative.

Id	Area	Description
ECR-E ECR-M	Electron Cyclotron Resonance Frequency	Contribute to the planning, execution, data analysis and modelling of experiment using ECRH/ECCD
ICR-E ICR-M	Ion Cyclotron Resonance Frequency	Contribute to the planning, execution, data analysis and modelling of experiment studying / developing ICRF heating scenarios in terms of ICRF wave absorption, RF sheaths, antenna loading
NBI-E NBI-M	Neutral Beam Ion heating	Contribute to the planning, execution, data analysis and modelling of NBI penetration, distribution and current drive efficiency
EQR-E EQR-M	Equilibrium Reconstruction	Contribute to plasma equilibrium reconstruction using internal constraints
CMHD-E CMHD-M	Core MHD	Contribute to the planning, execution, data analysis and modelling of experiments requiring characterisation of MHD core instabilities
DIS-E DIS-M	Disruptions	Contribute to the planning, execution, data analysis and modelling of experiments in the domain of disruptions (disruption causes, prevention, VDEs, halo currents, detection and prediction etc.), their mitigation with MGI and disruption avoidance schemes.
RE-E RE-M	Runaway Electrons	Contribute to the planning, execution, data analysis and modelling of experiment on runaways' dynamics and their mitigation using massive gas injection. Analyse related thermal loads and impact on plasma operation.
FSTP-E FSTP-M	Fast Particles and fast-particle driven instabilities	Contribute to the planning, execution, data analysis and modelling of experiments where fast particles or fast particle-driven instabilities play a central role.
MC-E	Machine conditioning	Contribute to the planning, execution, data analysis of experiments studying / requiring machine conditioning characterisation with different techniques (baking, ICWC, ECWC and GDC). This includes also interpretation of wall conditions after disruptions.
PF-E PF-M	Particle fuelling	Contribute to the planning, execution, data analysis and modelling of experiments studying / developing plasma fuelling by gas, pellet and recycling with respect to plasma performance and plasma edge conditions.
GBR-E	Gas Balance and Recycling	Contribute to the planning, execution, data analysis of experiments requiring gas balance studies, recycling and retention quantification
PWI-E	Plasma-Wall	Contribute to the planning, execution, data analysis and modelling of

PWI-M	interaction	experiments studying first wall and/or divertor erosion in steady-state and transients (erosion fluxes, re-erosion/ re-deposition, impurity , recycling and CX fluxes, material mixing with seeding impurities and wall materials, material migration) as well as material melting.
DUST-E DUST-M	Dust production and transport	Contribute to the data/interpretation of dust production, dust transport analysis and dust transport modelling.
DIVSOL-E DIVSOL-M	Divertor and SOL plasma physics	Contribute to the planning, execution, data analysis and modelling of divertor physics studies under steady-state conditions and during ELMs. Divertor characterisation from low recycling regime to detachment with volume recombination. Divertor modelling with 2D/3D edge codes.
IMPS-E IMPS-M	Impurity Seeding	Contribute to the planning, execution, data analysis and modelling of experiments with radiating divertor operation by impurity seeding. Analysis of the degree of detachment and exploration of potential feedback control. Interpretation and prediction of non-recycling impurity particle transport.
EPEE-E EPEE-M	Edge, Pedestal & ELMs	Contribute to the planning, execution, data analysis and modelling of experiments studying / requiring plasma edge pedestal measurements (temperature, density, rotation…), characterisation of the edge pedestal structure, dimensionless and dimensional scaling, L-H transition physics, threshold scaling. Perform data analysis and modelling of plasma pedestal MHD.
ELMM-E ELMM-M	ELM Mitigation (pellets, magnetic perturbations, kicks)	Contribute to the planning, execution, data analysis and modelling of experiments using pellet/vertical-kicks ELM pacing or ELM mitigation with resonant /non resonant magnetic perturbation.
3D-E 3D-M	3D physics	Contribute to the planning, execution, data analysis and modelling of experiments related to externally imposed magnetic perturbations and their effects on plasma.
SDI-E SDI-M	Scenario development and integration	Contribute to the planning, execution, data analysis and modelling of experiments to develop H-mode discharges (baseline, hybrid) and integrated solutions for ITER-relevant scenarios.
CT-M	Core transport	Contribute to the modelling of core transport in support of experiments. Interpretative analysis (estimation of transport coefficients) and predictive modelling for thermal, particle and momentum transport. Validate empirical and theory-based transport model and estimate the region of applicability. Based on model validation contribute to planning of future experiments via predictive transport modelling.
IMPT-E IMPT-M	Impurity Transport	Contribute to the planning, execution, data analysis and modelling of experiments investigating / requiring / developing impurity accumulation avoidance techniques.
TURB-E TURB-M	Turbulence	Contribute to the planning, execution, data analysis and modelling of turbulence properties and impact of turbulence on heat, particle and momentum transport. Interpretation of measurements comparing with analytic theory and running detailed linear/nonlinear micro-stability analysis/simulations.
PCTR-E PCTR-M	Plasma Control	Contribute to the planning, execution, data analysis and modelling of experiments requiring plasma control (includes all control tools: detachment, NTM,…). Select appropriate measurements, actuators and procedures for real time control of plasma behaviour, such as detachment, impurity penetration, ELM frequency, fuelling, NTMs, etc…

I.2. Competencies related to high level diagnostics analysis (for non-IPP/ non-EPFL diagnostics of AUG / TCV, respectively)

Some diagnostics on AUG and TCV are issued from collaborations with external laboratories. It is then necessary to call for staff able to perform high level analysis (data acquisition, data validation, writing public shot files, reporting

systematic errors and control room support) for MST1 experiments. **For any maintenance & commissioning work on these diagnostics, please see the following section.**

Id	MST1 machine	Diagnostic
REF	AUG	Reflectometry
CTS	AUG	Collective Thomson Scattering
PELV	AUG	Pellet video
FILD	AUG	Fast Ion Loss Diagnostic
ECEI	AUG	ECE Imaging
IR	AUG	IR camera
LP	AUG	Langmuir probes
LIB	AUG	Lithium beam
CAM	TCV	Multi-filter camera system
BDS	TCV	Doppler backscattering diagnostic
SPEC	TCV	Divertor spectrometer

I.3. How to apply for participation in Experiments / Tasks

- **Apply though "Annex 5 - Form to propose participation in the MST1 programme"**
- **Note there are two worksheets in this file: "AUG proposed participation" for participation in MST1-AUG experimental campaign and "TCV proposed participation" for participation in MST1-TCV experimental campaign.**
- From the drop-down list in columns O, P, Q and R, enter the competencies applying the most to you
- From the drop-down list in columns AA, AB, AC, AD and AE, indicate experiments/tasks (see Annex 2) you would like to contribute to, with these competencies.
- In columns AK/AL describe the work you wish to perform for these experiments at the AUG/TCV site and back in your home institution
- In columns AM to AV for 2015 and in columns BC to BL for 2016, propose stays at the AUG / TCV site (matching the dates at which the experiment(s) you are interested in will be performed- see Annex 3)
    - When proposing participation in experiment(s), it is highly recommended that the proposed stay(s) on the AUG or TCV sites cover more than the single week when the experiment(s) is/are to be performed. This is particular true for scientific coordinators. The overall commitment to the programme needs to be high enough to allow a significant contribution.
    - To avoid formatting issues the dates to be entered are provided through a drop-down menu.
    - ENTER 1st DAY ON-SITE and LAST DAY ON-SITE (note that the date drop down menu does not allow arriving /leaving during week-end or on bank holidays). The PMU will estimate the travelling time associated taking into account the EUROfusion mission rules.
    - Stay can start 2 weeks ahead and end two weeks after the campaigns.
- In column AX for 2015 and in column BN for 2016, proposed analysis time back in your home institution entering WEEKS
- If you wish to be Scientific/Task Coordinator: from the drop-down menu in column G to J, select the relevant experiment(s) or task(s)

II. List of diagnostics & systems eligible for mission support

Mission days will be provided for the following items:

- Operational support for AUG and TCV systems which cannot be provided by IPP and EPFL staff, respectively
- Maintenance and commissioning of AUG and TCV diagnostics issued from collaborations with external laboratories.

II.1. Mission support for AUG and TCV systems (which cannot be provided by IPP and EPFL staff)

In the table below, the AUG / TCV systems for which IPP and EPFL cannot provide operational support are listed.
It is accepted that people applying for mission's days selecting these "Id" will stay for long period particularly during campaigns.

Id	MST1 machine	Description
IR-Camera	AUG	Operation of the IPP Infrared thermography system
MEM&Probes	AUG	Operation of the IPP Langmuir Probes and mid-plane manipulator
LIB-Diagnostic	AUG	Operation of the Lithium beam diagnostics
GYR	TCV	Operation of the gyrotron: calibration, commissioning & operation

II.2. Mission support for diagnostics maintenance and commissioning (for AUG and TCV diagnostics issued from collaborations with external laboratories)

MST1 will provide some mission support for maintenance and commissioning of AUG and TCV diagnostics issued from collaborations with external laboratories. This is additional to the competencies request which is specifically associated with some MST1 experiments (see section I.2 of this annex). It is obvious that there is a grey zone between these two types of support (missions only for maintenance & commissioning work and missions and manpower for competencies related to specific high level analysis and control room support) but so far no other solution could be envisaged.

Id	MST1 machine	Beneficiaries involved	Diagnostic	Status
REF_PROFILE (LFS/HFS)	AUG	IST	Multi-channel HFS/LFS O-mode FMCW profile reflectometer	Operational
REF_FLUCTUATION (LFS/HFS)	AUG	IST	Dual-channel LFS O-mode fluctuation reflectometer	Operational
REF_PROFILE (Ufast)	AUG	CEA	Dual-channel X-mode Ultra-fast-swept profile reflectometer	Under development /operational
REF_DOPPLER	AUG	CEA	Two X-mode Doppler reflectometers operated in conjunction with existing IPP V and W-band channels	Under development / operational
REF_CORRELATION	AUG	FZJ	Multi-antenna poloidal correlation reflectometer	Under development /operational
REF_ICRF	AUG	ENEA, IST and CEA	Multi-antenna X-mode FMCW edge profile reflectometer for ICRF antenna	MST2 project*
ECEI	AUG	FOM_DIFFER	ECE Imaging	Operational
CTS	AUG	DTU	Collecting Thomson Scattering	Operational

PEL-Camera	AUG	Wigner RCP	Pellet video diagnostic	Operational
FILD1	AUG	CIEMAT (U Sevilla)	FILD1 (fast ion detector)	Operational
FILD 2/3	AUG	CIEMAT (U Sevilla)	FILD 2 / FILD 3 (fast ion detector)	Operational
FILD 4/5	AUG	CIEMAT (U Sevilla)	FILD 4 /FILD 5 (fast ion detector)	MST2 project*
HATS	AUG	DIFFER	High accuracy Thomson Scattering pedestal diagnostic for bootstrap current measurements	MST2 project*
Int_probes	AUG /TCV	OEAW CCFE	Adaptor to interchange probes	MST2 project*
MF_Camera	TCV	FOM-DIFFER	Multi-filter camera system	Operational
DBS	TCV	CEA (LPP)	Doppler backscattering diagnostic	Operational
DIVSPEC	TCV	CCFE (U. York)	Divertor spectrometer: impurity lines, spatially resolved	Under development/operational

* In 2015, this diagnostics are projects developed under WP MST2. Depending on the project end and status of the related diagnostics, the related missions will be supported by MST1 or MST2. This will be decided a later stage.

II.3. How to apply for related mission support

- **Apply though "Annex 5 - Form to propose participation in the MST1 programme"**
- **Please fill worksheet "AUG proposed participation" to request mission days on AUG and worksheet "TCV proposed participation" to request mission days on TCV**
- From the drop-down list in columns W and X, select the "Id" of the diagnostics or systems for which you would like to apply for mission's day.
- In columns AY and BO indicated the number of proposed mission days for 2015 and 2016 respectively.
- It will be possible to use the mission days allocated during or outside the experimental campaigns (by applying for these mission days through the mission application e-form)