

18th November 2024, WPTTE GPM Meeting, Garching

Introduction to the WP TE program in 2025

N. Vianello for TE TFL

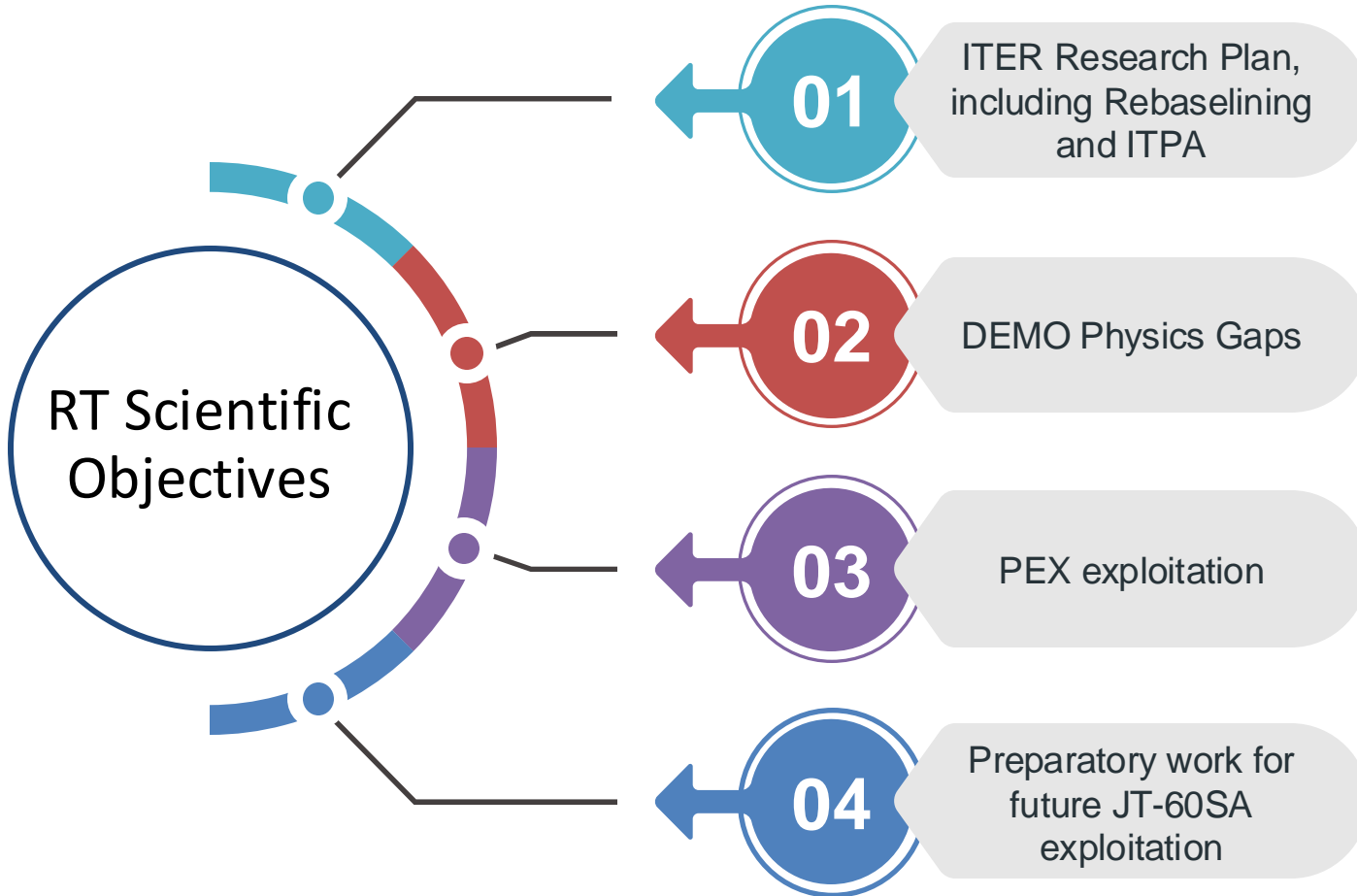
E. Tsitrone, N. Vianello, M. Baruzzo, A. Hakola, V. Igochine, D. Keeling, B. Labit



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How we build the WPTE program



- Research Topic structures and Scientific objectives build on the basis of:
 - ITER Research Plan (now considering the rebaselining)
 - DEMO Central Team physics input
 - PEX exploitation
 - Preparation of future JT-60SA operation
- Program build to exploit the peculiarities of single tokamaks (JET, TCV, AUG, WEST and MAST-U) in an integrated way
- Call for participation include experiments (2025) and analysis (2022-2024) and JT-60SA Experimental Team activities

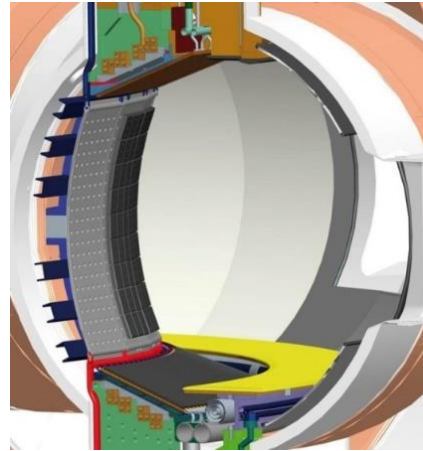


Devices included in the present Call for Participation

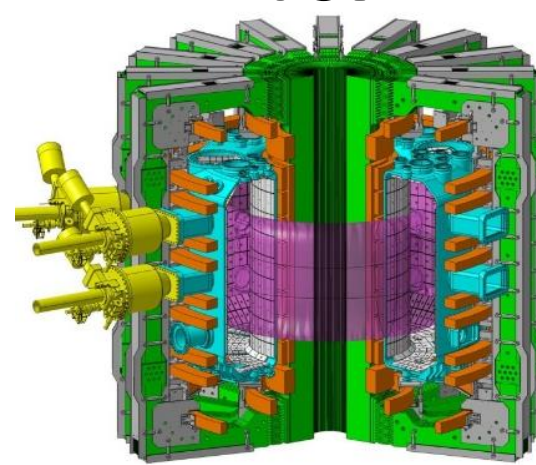
AUG



WEST



TCV



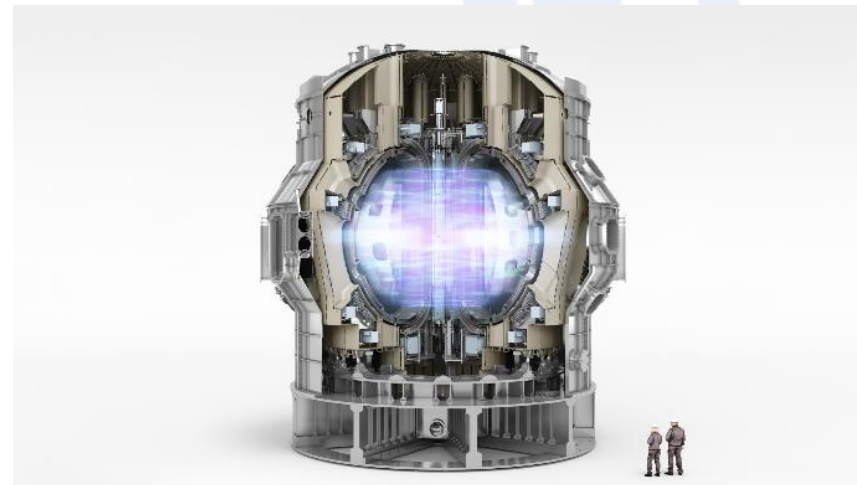
MAST-U



JET



JT-60SA





High Level Objectives

- Address urgent issues related to **ITER full W** using TE metallic devices (AUG, WEST + JET) : far SOL loads, W transport in pedestal, start up on W limiters, RE on W first wall, boronisation ...
- Exploit the **PEX upgrade of AUG** towards qualifications of ADCs at high P/R
- **Modelling effort** for extrapolation of results from TE devices to ITER / DEMO (e.g. ADC for DEMO, impurity mix for ITER ...)
- Prepare **JT-60SA scientific exploitation** (OP2 programme)

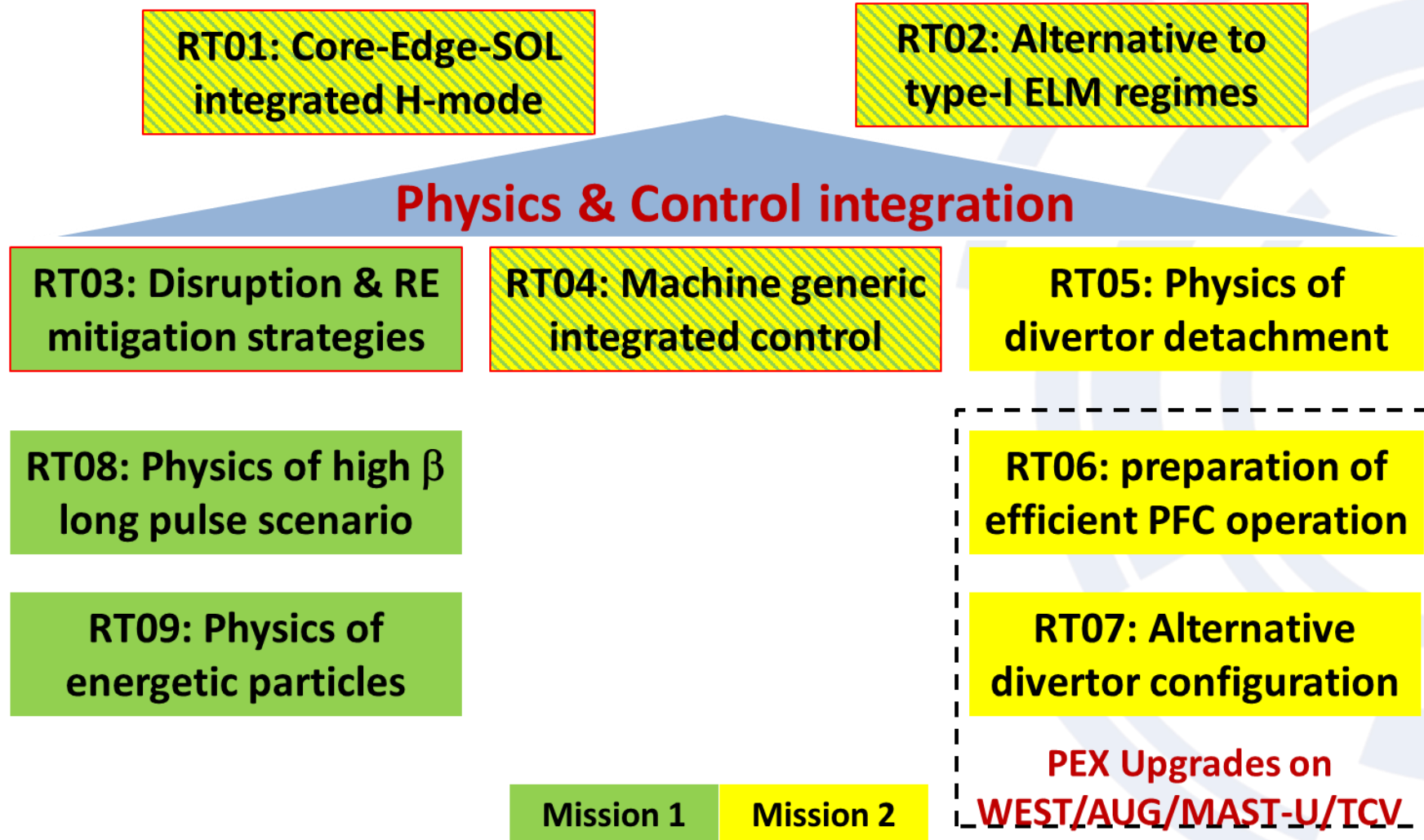


Structure of the programme

- **Same structure** kept with 9 Research Topics (RT) + 2 Research Topics for JET (data validation / data analysis from past campaigns)
- Scientific objectives of the RT slightly amended to reflect priorities (boronisation under RT06, extension of SF to multiple X point configuration under RT07, explicit links to JT-60SA in RT08/RT09 ...)
- Coordination : **same team** of Research Topics Coordinators (RTC)



2024 Research Structure in continuity





RTCs and rSL

Research Topic	Research Topic Coordinator	RTC	RTC	RTC	Reference TFL - rTFL	Deputy rTFL
RT22-01	L. Frassinetti	C. Giroud	S. Wiesen	D. King	N. Vianello	B. Labit
RT22-02	M. Faitsch	M. Dunne	O. Sauter	E. Viezzer	B. Labit	D. Keeling
RT22-03	O. Ficker	U. Sheikh	C. Reux	IO	V. Igochine	A. Hakola
RT22-04	L. Piron	A. Mele	Ch. Vincent		M. Baruzzo	V. Igochine
RT22-05	H. Reimerdes	M. Bernert	S. Henderson	N. Fedorczak	N. Vianello	E. Tsitrone
RT22-06	Y. Corre	A. Widdowson	K. Krieger		E. Tsitrone	A. Hakola
RT22-07	C. Theiler	K. Verhaegh	D. Brida		A. Hakola	B. Labit
RT22-08	A. Bock	C. Piron	F. Auriemma		M. Baruzzo	V. Igochine
RT22-09	Y. Kazakov	J. Galdon	A. Jansen	R. Ochoukov	D. Keeling	M. Baruzzo



Planned device availability for 2025

Year	2025											
Months	Jan.	Feb	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
AUG												
TCV												
MAST-U												
WEST												
	Shutdown	Restart	Campaign	Break								
Years	2025											

- 4 devices running in early 2025
- AUG intensive WPTE program, TCV running ~continuously (short shutdowns for changing baffle configurations)
- New features : upper divertor AUG, ECRH on WEST, MAST-U cryopump

	TE fraction	Shot budget
AUG	50 %	584 (up to July 2025)
MAST-U	~35 %	346
TCV	40 %	1320
WEST	40 %	384



Received Proposals

A total of 206 Experimental proposal received with some of the devices heavily overbooked

RTA	AUG (Scientific Pulses)	AUG (Pulse Sce. Dev)	AUG (Total Session)	TCV (Scientific)	TCV (Sce. Dev)	TCV (Total)	MAST-U (Scientific)	MAST-U (Sce. Dev)	MAST-U (Total)	WEST (Scientific)	WEST (Sce. Dev)	WEST (Total)
RT-01	169	66	235	139	18	157	44	0	44	111	27	138
RT-02	171	36	207	231	194	425	149	20	169	40	10	50
RT-03	254	36	290	248	78	326	15	5	20	99	66	165
RT-04	160	16	176	306	88	394	46	20	66	148	5	153
RT-05	138	59	197	137	31	168	107	33	140	211	17	228
RT-06	72	33	105	0	0	0	0	0	0	551	31	582
RT-07	133	84	217	303	80	383	249	73	322	35	2	37
RT-08	120	122	242	116	80	196	159	80	239	55	20	75
RT-09	137	39	176	205	85	290	71	5	76	20	20	40
Total	1354	491	1845	1685	654	2339	840	236	1076	1270	198	1468
Available			584			1320			346			384



Main priorities for 2025 in present TE devices

AUG: PEX exploitation (extended H-mode operational space for ADC), SPI, W related research (transport, transients, PWI, RE damage), High- β hybrid scenario, small-ELM

WEST: High fluence campaign, W sources and transport in long-pulse operation, W PWI for ITER (boronisation, RE damage in W wall ...)

MAST-U: ADC exploration and qualification, no-ELMs, high- β , detachment studies, fast particle

TCV: ADC exploration and qualification, high- β , detachment studies, Pedestal physics (peeling/ballooning), Small-ELM/no-ELM scenarios (NT/QCE), fast particle

JET: Full exploitation of collected data and interpretative and predictive modelling



Priorities reflected in the tentative shot allocation for 2025 (to be revised after General Planning Meeting)

AUG: PEX
exploitation,
SPI

	AUG	MAST-U	TCV	WEST	Sum
RT01	45	24	120	15	189
RT02	45	48	120	15	228
RT03	60	0	120	30	210
RT04	35	32	60	15	157
RT05	35	32	150	15	232
RT06	30	0	0	180	210
RT07	120	48	170	15	353
RT08	50	48	200	15	313
RT09	30	40	100	0	170
Cont	134	74	280	84	572
Sum	584	346	1320	384	2634

**WEST: High fluence
campaign**

MAST-U: ADC, high- β

TCV: ADC, high- β

- More emphasis on RT08/RT09 than in previous years



2025 Call for participation Structure

	Research topic	Title	IMS tag
Mission 1	RT-01	Core-Edge-SOL integrated H-mode scenario compatible with exhaust constraints in support of ITER	RT01
	RT-02	Physics understanding of alternatives to Type-I ELM regime	RT02
	RT-03	Strategies for disruption and run-away mitigation	RT03
	RT-04	Physics-based machine generic systems for an integrated control of plasma discharge	RT04
	RT-08	Physics and operational basis for high beta long pulse scenarios	RT08
	RT-09	Physics understanding of energetics particles confinement and their interplay with thermal plasma	RT09
Mission 2	RT-05	Physics of divertor detachment and its control for ITER, DEMO and HELIAS operation	RT05
	RT-06	Preparation of efficient Plasma Facing Components (PFC) operation for ITER, DEMO and HELIAS	RT06
	RT-07	Physics understanding of alternative divertor configurations as risk mitigation for DEMO	RT07
JET specific	RT-10	JET data validation	RT10
	RT-11	Analysis and modelling of DTE2 related experiments on JET	RT11
JT-60SA specific	TG-ORD	Operation Regime Development	RT12
	TG- MHD	MHD Stability and Control	RT13
	TG-TC	Transport and Confinement	RT14
	TG-EP	High Energy Particle Behaviour	RT15
	TG-PED	Pedestal and Edge Physics	RT16
	TG-DSP	Divertor, Scrape-Off Layer & Plasma-Material Interaction	RT17
	IMAS	Integrated Data Validation and data access with IMAS	RT18



JET Specific Research Topics

#	RT10
D2	Data analysis and modelling in support of ITER/DEMO not otherwise related to D1 or RT-01 to 09

We will be happy to receive commitments from person to be trained in specific diagnostic for data validation, in particular KS5 (CXRS/CHEAP) and KT3 (divertor spectroscopy)

#	RT11
D1	Continue the analysis and modelling of the JET experiments related to DTE2
D2	Data analysis and modelling in support of ITER/DEMO not otherwise related to D1 or RT-01 to 09

Aimed to support the activity for JET exploitation not included in experiment performed under RT01-RT09



JT-60SA specific

- Present call includes resources for the EUROfusion supported participation to the JT-60SA Experimental Team for analysis of IC/OP1 as well as modelling in preparation for future experimental campaigns (e.g. OP2)
- Interested persons should apply to JT-60SA Specific Research Topic (RT12-RT18) coordinated by **European Topical Group Leaders/Designated Contact Person**

	Research topic	Title	IMS tag	TGL/CP
JT-60SA specific	TG-ORD	Operation Regime Development	RT12	J. Garcia
	TG- MHD	MHD Stability and Control	RT13	G. Pucella
	TG-TC	Transport and Confinement	RT14	L. Garzotti
	TG-EP	High Energy Particle Behaviour	RT15	Y. Kazakov
	TG-PED	Pedestal and Edge Physics	RT16	Y. Liang
	TG-DSP	Divertor, Scrape-Off Layer & Plasma-Material Interaction	RT17	G. Falchetto
	IMAS	Integrated Data Validation and data access with IMAS	RT18	F. Imbeaux



Aim of the present meeting

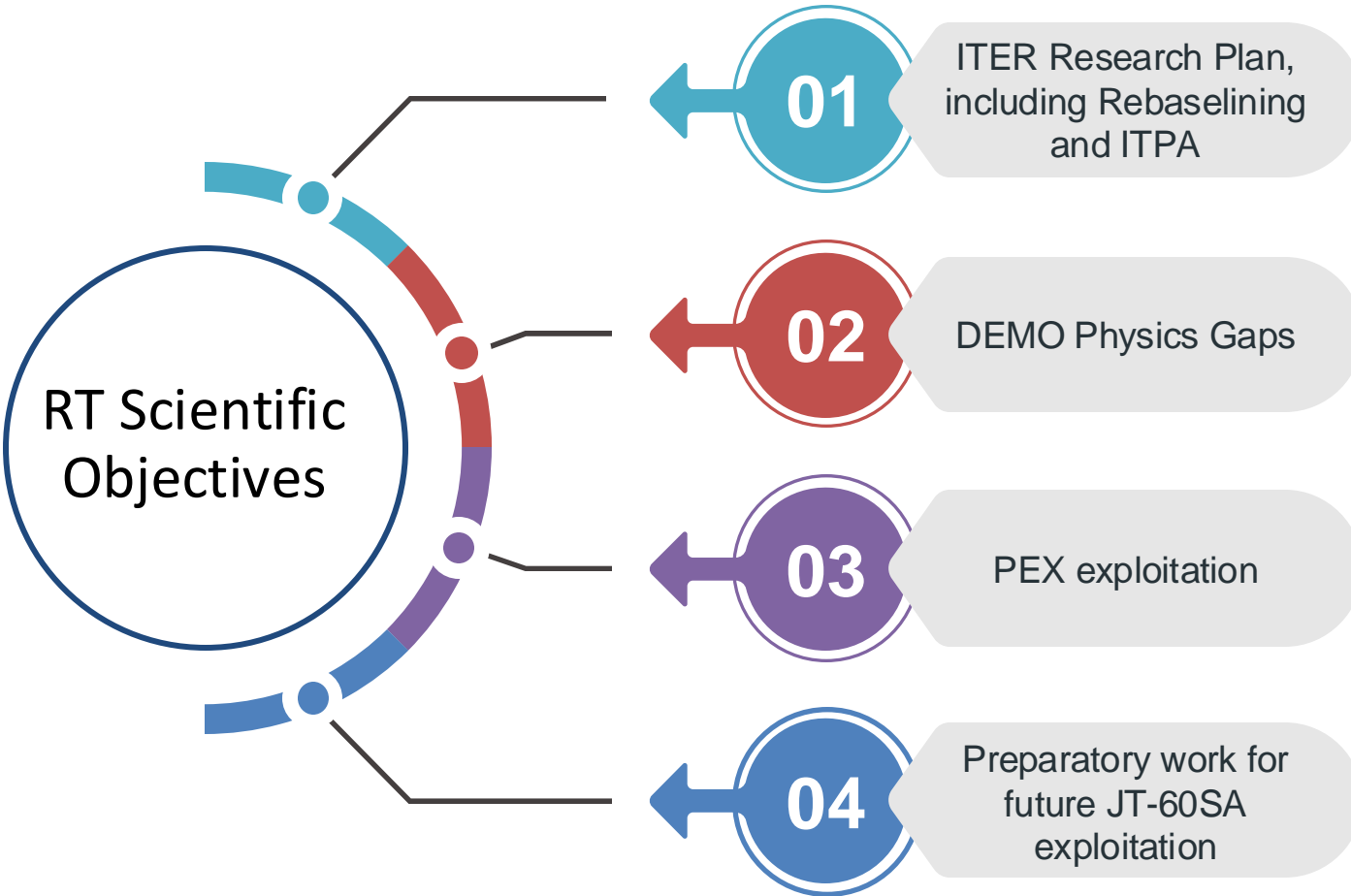
Please bring in your thoughts / ideas / doubts – constructive criticism

Important items to be discussed.

- Discuss any justification for the proposed priorities (if different) and/or “good pulse” numbers for the achieving the research topic objectives.
- Highlight any special technical requirements (machine special settings or diagnostics) which will need significant advanced preparation, or which represent unusual machine risks.
- Identify overlaps or coordination needs between research topics or proposals
- Identify possible gaps in the proposed activities.
- Identify and discuss the strategy and the best timing for the experiments to take place.
- Check that the proposed pulse allocation is in line with the discussed/agreed priorities.
- Provide useful guidance for proper answering to the call for participation



Prioritization scheme and criteria



Proposal Evaluated according to the criteria:

Adherence to the Scientific Objectives

Team effort

Size and feasibility

All these aspects were considered by the TFLs when setting the priorities – according to the following scheme

P1: experimental priority for 2025

P2: will be done if time allows after Prio 1 experiments are completed/or incorporated in main scenario if feasible

P3: back-up programme

PB: piggy-back experiment/pure analysis proposal



Agenda

18/11

13:00	Goal of the meeting / agenda <i>Main lecture hall</i>	13:00 - 13:20
	AUG : machine news and program for 2025 (15'+5') <i>Main lecture hall</i>	Arne Kallenbach 13:20 - 13:40
	TCV : machine news and program for 2025 (15'+5') <i>Main lecture hall</i>	Stefano Coda 13:40 - 14:00
14:00	MAST U : machine news and program for 2025 (15'+5') <i>Main lecture hall</i>	James Harrison 14:00 - 14:20
	WEST : machine news and program for 2025 (15'+5') <i>Main lecture hall</i>	Annika Ekedahl 14:20 - 14:40
	RT01: Core-Edge-SOL integrated H-mode scenario compatible with exhaust constraints in support of ITER <i>Main lecture hall</i>	Benoit Labit 14:40 - 15:25
15:00	Coffee break <i>Main lecture hall</i>	15:25 - 15:45
	RT02: Physics understanding of alternatives to Type-I ELM regime <i>Main lecture hall</i>	Benoit Labit 15:45 - 16:30
16:00	RT04: Physics-based machine generic systems for an integrated control of plasma discharge <i>Main lecture hall</i>	Matteo Baruzzo 16:30 - 17:15
17:00	RT05: Physics of divertor detachment and its control for ITER, DEMO and HELIAS operation <i>Main lecture hall</i>	Nicola Vianello 17:15 - 18:00

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09:00	RT06: Preparation of efficient Plasma Facing Components (PFC) operation for ITER, DEMO and HELIAS <i>Main lecture hall</i>	Emmanuelle Tsitrone 09:00 - 09:45
	RT07: Physics understanding of alternative divertor configurations as risk mitigation for DEMO <i>Main lecture hall</i>	Antti Hakola 09:45 - 10:30
10:00	Coffee break <i>Main lecture hall</i>	10:30 - 10:50
	RT08: Physics and operational basis for high beta long pulse scenarios <i>Main lecture hall</i>	Matteo Baruzzo 10:50 - 11:35
11:00	RT09: Physics understanding of energetics particles confinement and their interplay with thermal plasma <i>Main lecture hall</i>	David Keeling 11:35 - 12:20
12:00	Lunch <i>Main lecture hall</i>	12:20 - 13:30
13:00	RT03: Strategies for disruption and run-away mitigation <i>Main lecture hall</i>	Valentin Igochine 13:30 - 14:15
14:00	Participating in JET past campaigns analysis (RT11) <i>Main lecture hall</i>	David Keeling 14:15 - 14:35
	Participating in JT-60SA analysis (RT12 to RT18) <i>Main lecture hall</i>	Jeronimo Garcia 14:35 - 14:55
15:00	Wrap up and looking forward <i>Main lecture hall</i>	Emmanuelle Tsitrone 14:55 - 15:15
	adjourn <i>Main lecture hall</i>	15:15 - 15:17