EXPERIMENTAL PROPOSALS 2009

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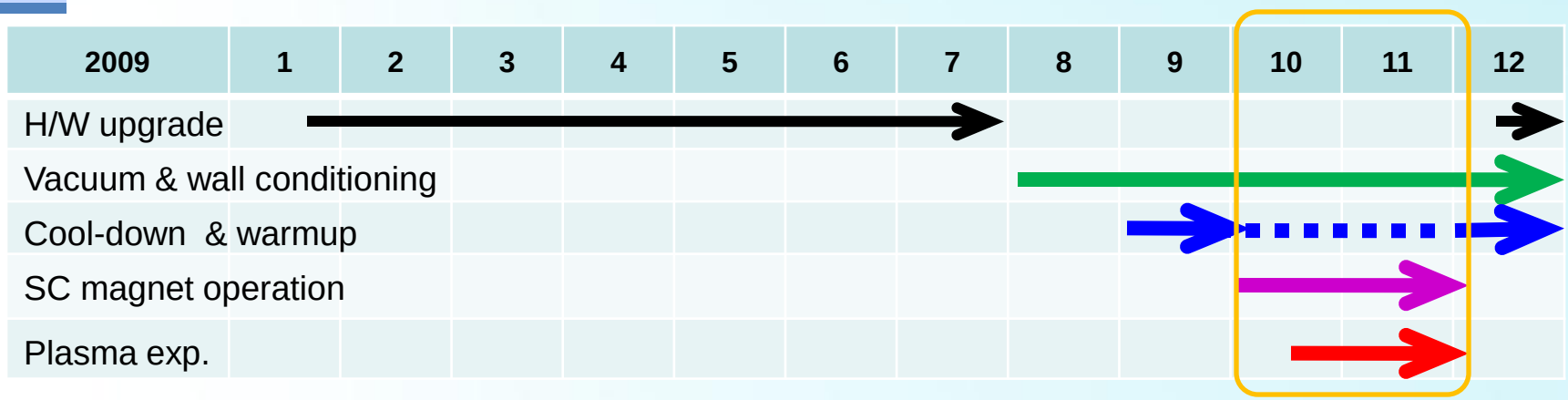
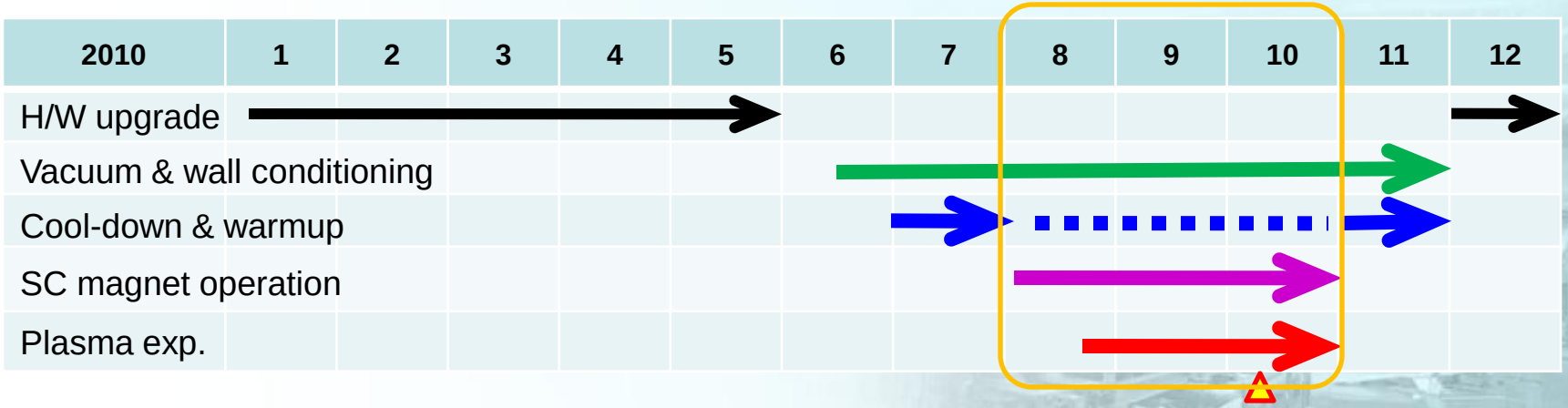
KSTAR

Available operation time in 2009-2010

2009 Operation



2010 Operation



IAEA FEC
In Korea

System availability for 2009-2010 operation

	2008	2009	2010
SC Magnetic system			
• TF coils • PF coils & leads	• 15 kA • 4 kA unipolar • Up/Low series	• 35 kA • 4 kA bipolar • Up/Low series	• 35 kA • 20 kA bipolar • Up/Low separate (4 more PF PS)
In-vessel system			
• In-vessel coil • PFC • Wall conditioning	 • Inboard limiter • Glow DC, RF DC	 • Inboard limiters • + boronization	• Vertical control • Divertor / limiters • Passive stabilizer • + PFC baking
Heating system			
• ECH • ICRH • NBI • LHCD	• 0.5 MW (84 GHz) • 0.03 MW (30 MHz)	• 0.5 MW (84 GHz) • 0.3 MW (45 MHz)	• 0.5 MW (84 GHz) • 0.5 MW (110 GHz) • 1 MW • 1 MW • 0.5 MW
Infra system			
• Electricity	• 50 MVA (154 kV)	• 50 MVA (154 kV)	• 100 MVA (154 kV)

Operational parameters in 2009-2010

	2008	2009	2010
Experimental parameters			
• Peak TF field • Operation TF field • Flux • Ip • Plasma shape • Gas	• 1.5 T • 1.5 T • ~ 1 Wb • < 133 kA • Circular • H_2 (He for DC)	• 3.5 T • 1.5 T, 3.0 T • ~ 2 Wb • ~ 300 kA • Circular • H_2 (He for DC), D_2	• 3.5 T • 1.5 T, 2.0 T, 3.0 T • ~ 4 Wb • < 1 MA • Double null • H_2, D_2
Control			
• Plasma control	• PF blip & start up • Ip, Rp , ne	• PF zero-crossing • Ip, Rp, ne	• IVC control • Ip, Rp, Zp, shape
Diagnostics			
• Diagnostic systems	• MD/ MMWI/ ECE / Hα/ filterscope/ ViS . TV	• MD/ MMWI / ECE / Hα/ filterscope/ Vis. TV • PD / XCS / Soft X-ray / Reflect.	• MD / MMWI / ECE/ Hα/ filterscope/ Vis. TV • PD / XCS / Soft X-ray / Reflect. • TS/ Hard X-ray / Fast neutral / ECEI/ IRTV

Near-term experiment plan

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
Operation (Vac,CD & WU)	'08. 3 ~ '08. 8 (6 mon.)	'09. 8 ~ '09.12 (5 mon.)	'10.6 ~ '10. 11 (6 mon.)	'11. 4~ '11. 9 (6 mon.)	'12. 2 ~ '12. 7 (6 mon.)
Experimental Goals	• First plasma startup • 2nd Harmonic ECH pre-ionization	• 1st Harmonic ECH Pre-ionization • Startup stabilization	• Shaping control & vertical stabilization • Heating	• Confinement (L-H) • Stabilization • Heating	• Plasma–Wall Interaction • Profile control • RWM, ELM control • Off-axis current drive
Target Operation Parameters	• B_T ~ 1.5 T • I_P > 0.1 MA • t_P > 0.1 s • Te > 0.3 keV • Ti ~ 0 keV • Flux ~ 1 Wb • Shape ~ Circular • Gas : H_2	• B_T ~ 3 T • I_P > 0.3 MA • t_P > 2 s • Te > 0.3 keV • Ti ~ 0.3 keV • Flux ~ 2 Wb • Shape ~ Circular • Gas : H_2, D_2	• B_T ~ 3 T • I_P < 1 MA • t_P ~ 10 s • Te ~ 1 keV • Ti ~ 1 keV • Flux ~ 4 Wb • Shape ~ DN(double null) • Gas : H_2, D_2	• B_T ~ 3 T • I_P < 1.5 MA • t_P ~ 10 s • Te ~ 1 keV • Ti ~ 3 keV • Flux ~ 6 Wb • Shape ~ DN & SN • Gas : D_2	• B_T ~ 3 T • I_P < 2 MA • t_P > 100 s (0.5 MA) • Te ~ 1 keV • Ti ~ 5 keV • Flux ~ 8 Wb • Shape ~ DN & SN • Gas : D_2
PFC & Wall conditioning	• Inboard limiter (belt) • Gas puff	• Inboard limiter (w/o cooling) • Boronization	• Divertor / Passive plate • PFC baking • In-vessel coil	• Cryopump operation • PFC cooling	• PFC cooling • *Pellet*
Magnetic control	• TF : 1.5 T • PF : 4 kA unipolar	• TF : up to 3.5 T • PF : +/-4 kA	• TF : up to 3.5 T • PF : +/-10 kA • IVCC : VS, RS	• TF : up to 3.5 T • PF : +/-15 kA • IVCC : FEC. RMP	• TF : up to 3.5 T • PF : +/-20 kA • IVCC : RMP, RWM
Heating operation	• ECH(84G): 0.5MW, 0.4s	• ECH(84GHz): 0.5MW, 2s • ICRH(45MHz): 0.3MW, 10 s	• ECH(84/110GHz): 0.5MW • ICRH(45MHz): 1MW, 10 s • NBI: 1.0MW, 10s • LHCD: 0.5MW, 2s	• ECH(84/110GHz): 0.5MW • ICRH(45MHz): 2MW, 10 s • NBI: 2.5MW, 10s • LHCD: 0.5MW, 2s • ECCD(170GHz): 1MW, 10s	• ECH(84/110GHz): 0.5MW • ICRH(45MHz): 2MW, 300 s • NBI :5MW, 300s • LHCD : 1MW, 2s • ECCD(170GHz): 1MW, 300s
Diagnostics	• MD (77 Ch)/ MMWI / ECE / Hα / filterscope / VS / TV	• MD/ MMWI / ECE / Hα / filterscope / VS / TV • PD / XCS (1 set) / Bolometer (resistive) / Reflect. / Soft X-ray	• MD / MMWI / ECE / Hα / filterscope / VS / TV • PD / XCS / Bolometer / Reflect. / Soft X-ray • Thomson Scattering / Hard X-ray / Fast neutral / IR TV / ECEI	• MD / MMWI / ECE / Hα / filterscope / VS / TV • PD / XCS / Bolometer / Reflect. / Soft X-ray • TS / Hard X-ray / Fast neutral / IR TV / ECEI • MSE / FIR / CES / neutron	• MD / MMWI / ECE / Hα / filterscope / VS / TV • PD / XCS / Bolometer / Reflect. / Soft X-ray • TS / Hard X-ray / Fast neutral / IR TV / ECEI • MSE / FIR / CES / neutron / VUV • MIR / BES / CI /

Research topics in 2009

Magnetic control

- Power supply control
  - TF magnet operation and protection test up to 35 kA
  - PF magnet & power supply control for zero-crossing
- Plasma control
  - Plasma current and position control (Ip, Rp)
- Magnetic probes & analysis
  - Refined characterization of the magnetics with additional sensors and electron beam system. (quantifying field errors, calibration of magnetic probes)
  - Understanding the material (Incoloy908) and geometry effects on plasma

Research topics in 2009

Heating researches

- ECH pre-ionization
  - Full exploitation of 84 GHz & 110 GHz Gryotron
  - Further Investigation of ECH assisted pre-ionization
  - Dependence on 1st & 2nd harmonics, injection directions
- ICRH heating and RF discharge cleaning
  - Exploitation of ICRH heating
  - Exploit RF discharge cleaning between shots

Research topics in 2009

Other researches

- Wall conditioning & wall interaction
  - Quantitative approach on wall conditioning & wall recycling
  - Hydrogen recycling/retention under different wall condition(Boronization, RFGDC, ICRH DC)
  - Characterization of the dust behavior
- Experiments
  - Disruption studies
  - Possible MHD Studies ; sawtooth manipulation, locked mode
  - Experiments based on the collected proposals (domestic /international)
- Data access and collaboration
  - Data access, analysis, logging
  - Remote experiments participation & operation