



Preliminary consideration on basic requirements -- diagnostic and CODAC

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- **The systems of diagnostics and CODAC would to be decided after the mission defined and physics designed.**

CODAC

- **Safety control:** interrupt for serious events: nuclear, fire, earthquake, ...; interlock for nuclear, entries, ...
- **Operational control:** operation scheduling; interlock for power supply, vacuum, heating, fuelling, cooling, ...; interrupt for serious events.
- **Plasma control:** shape, configuration, MHD, disruption, ...
- **Data:** acquisition, access, communication, display, ...
- **Others:** tritium breeding control, ... **according to decided mission.**

Plasma diagnostics

- **Configuration:** plasma shape, displacement, ...
- **Plasma parameters & profiles:** density, temperature, radiation/emission, current density, bate, storage energy, rotation, D/T ratio, ...
- **MHD instability:** NTM, ELM, AEs, RWM, ...
- **Fusion production:** neutron & profiles, alpha particle, gamma ray, fusion power, ...
- **Divertor and firstwall:** radiation, heat load, erosion, damages, ...
- **Others:** Tritium retention, scientific study needs. ...

CODAC and diagnostics

		Safety control			Opera. control			Plasma control			Data		Others		
		Interlock	Data flow	interruption	Interlock	interruption	Scheduling	Configuration	MHD/disruption	Profiles	Data acquisition	Data comm.	Tritium issue	Scientific issues
Diagnostics	Safety	Blue	Blue	Blue		Blue					Blue	Blue	Blue		Yellow
	Operational				Blue	Blue	Blue				Blue	Blue	Blue		Yellow
	Plasma				Cyan	Cyan	Cyan	Blue	Blue	Blue	Blue	Blue	Blue	Red	Yellow
	Blanket	Cyan	Cyan	Cyan	Cyan	Cyan	Cyan	Cyan	Cyan	Cyan	Blue	Blue	Blue		Yellow
	Data access	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Dark Blue	Dark Blue	Dark Blue		Yellow	
	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow		Yellow	

Big challenge of diagnostics

- **Long time measurement:** for plasma feedback control, ...
- **Surviving form radiation:** neutron, gamma ray.
- **Reliable diagnostics:** the current used diagnostics are too complicated for reactor. To explore the simple diagnostic systems and methods are necessary – integration diagnostic?
- **New diagnostics development:** for new studies in material, blanket, ...



Thank you for your attention