XLZD OD & cryostat

XLZD collaboration meeting
Breakout session

2 July 2025

1.05 Cryostat WBS

1.05.01 System Engineering & Management

- Reporting
- Industry engagement
- Interfaces documentation
- Compliance to codes and safety regulations
- Procurements
- Quality Assurance

1.05.02 Radioactivity modelling and simulations

- Cryostat model for sims
- Radioactivity budget : DM searches, 0νββ
- Outer detector efficiency

1.05.03 Material acquisition

- Material sample acquisition and screening
- Raw material (slabs)
- Material for cryostat fabrication (plates and forgings)
- Welding : electrodes, filling rodes

1.05.04 Outer Cryostat Vessel (OCV)

- Heads
- Walls
- Ports/flanges/rings
- Metrology and acceptance tests

1.05.05 Inner Cryostat Vessel (ICV)

- Heads
- Walls
- Ports/flanges/rings
- Metrology and acceptance tests

1.05.06 Cryostat support/suspension (CS)

- Suspension system
- ICV/OCV connection
- Levelling system
- Strain gauges
- Metrology and acceptance tests

1.05 Cryostat WBS

1.05.07 Ancillaries

- Umbilicals, fasteners, seals (cryogenic and elastomers), bags for transportation

1.05.08 Cleaning and plating

- Etching - all surfaces (except seal groves)
- Electroplating with pure copper - inner surface of the ICV
- Infrastructure if underground (? or in WBS 1.12)

1.05.09 Host site integration (a) horizontal and (b) vertical access

- Storage on the surface and u/g
- Conveyance
- Transportation and handling
- Fabrication
- Assembly
- Infrastructure

1.05.10 Assembly and installation on-site

- Assembly test and acceptance
- Installation on-site

1.05.XX Cryostat thermal modelling

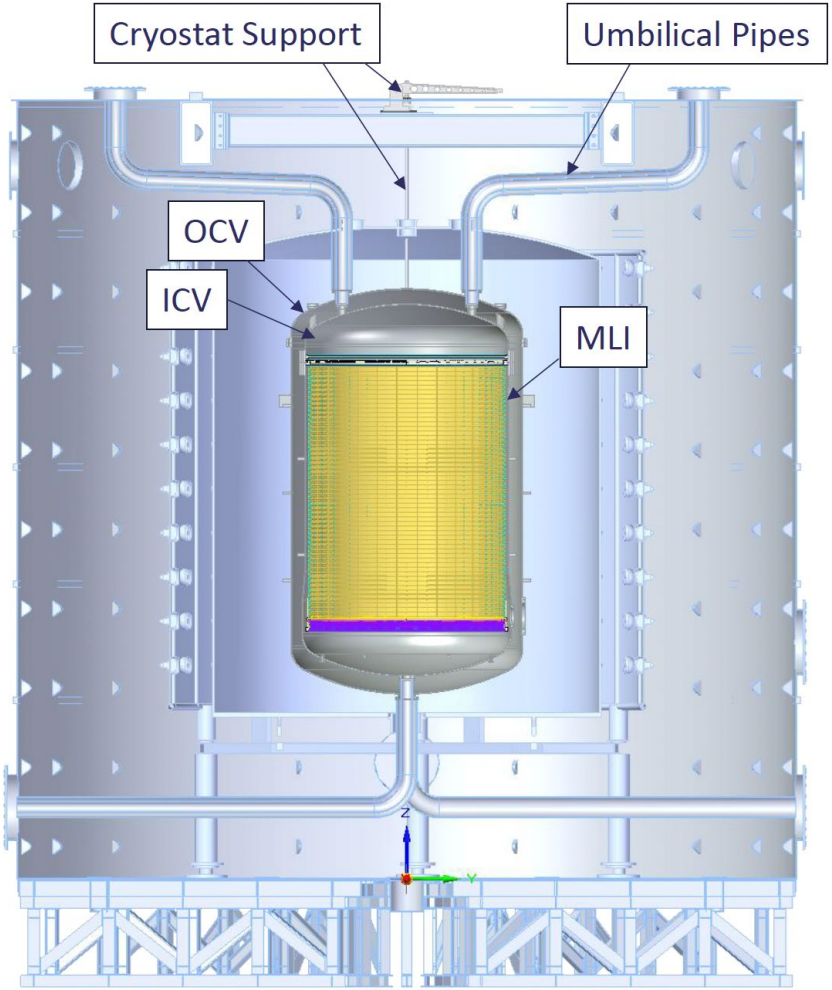
- Thermal calculations
- MLI design

1.07 Outer Detector

L2	L3		Description / migrate to WBS dictionary	Possible L4s			
1.07	**Outer Detector System**						
	1.07.01	System Engineering & Management					
	1.07.02	Optical modeling and simulations	*Integrated optical design including consideration of backgrounds from media and readout system*	muon veto modeling	neutron detector modeling	background rejection studies	other physics studies
	1.07.03	Water tank / outifitting and systems	*Water tank, related infrastructure, and purification system. At Boulby, excludes water tank shell - facility provided. Includes fixtures for muon veto photosensors and reflective coating.*	Water tank	Water purification	Photosensor support structure	Photosensors
	1.07.04	Neutron detector containment and support	*If needed, containment vessel for neutron detector + support systems for vessel and PMTs, support for optical separation between volumes*	Optical separation for neutron detector	Photosensor support structure	Potential inner containment for (Wb)LS	Feedthroughs
	1.07.05	Neutron detector medium and related systems	*Medium - Gd-water, Gd-WbLS, Gd-LS. Production, circulation etc*	(Wb)LS purification for inner vessel	(Wb)LS recirculation for inner vessel [[fluid flow sims at L5]]	(Wb)LS provision for inner vessel	water, as/if needed for outer vessel
	1.07.06	Gadolinium system	*Initial prep of Gd and online purification of Gd*	Gd purchase	Initial Gd purification	Gd recirculation needs	
	1.07.07	Neutron photosensor system	*Photosensor system for neutron detection, might be different depending on choice of media; includes cabling, and includes feedthroughs within this L2.*	PMT choice	PMT purchase	PMT testing	PMT cabling
	1.07.08	Reflectors	*Reflector needs and design*	Reflector need (choice)	Reflector design	Purchase	
	1.07.09	Readout	*Frontend electronics and readout for muon veto and neut*	HV for OD	Muon veto readout	Neutron detector readout	Triggering
	1.07.10	OD calibration	*Calibration systems for OD - optical and source*	Deployment system	In-situ light injection system	Suite of deployable sources	
	1.07.11	Radioscreener	*Dedicated screening system and effort for neutron detector medium*	Design & production	Low background deployment	Background measurements	
	1.07.12	Slow controls					

Questions

1. Material compatibility of OD fluid with:
    a. CP Titanium Grade-1
    b. Stainless Steel 300
    c. Pure Nickel
2. OD efficiencies for different cryostat models with
    a. CP Titanium Grade-1
    b. Stainless Steel 300
    c. Pure Nickel
3. Access and staging
    a. Cryostat assembly in the water tank - staging
    b. TPC serviceability/upgrade
    c. Site dependencies / interface with facilities
4. Interfaces
    a. Umbilicals (top and bottom)
    b. HV (not in cryostat WBS)
    c. Suspension rods
    d. Calibration tubes + deployable sources (interface OD/calibration)
    e. Calibration with neutrons (interface OD/calibration)
    f. Reflector on OCV surface


Cryostat Support
Umbilical Pipes
OCV
ICV
MLI