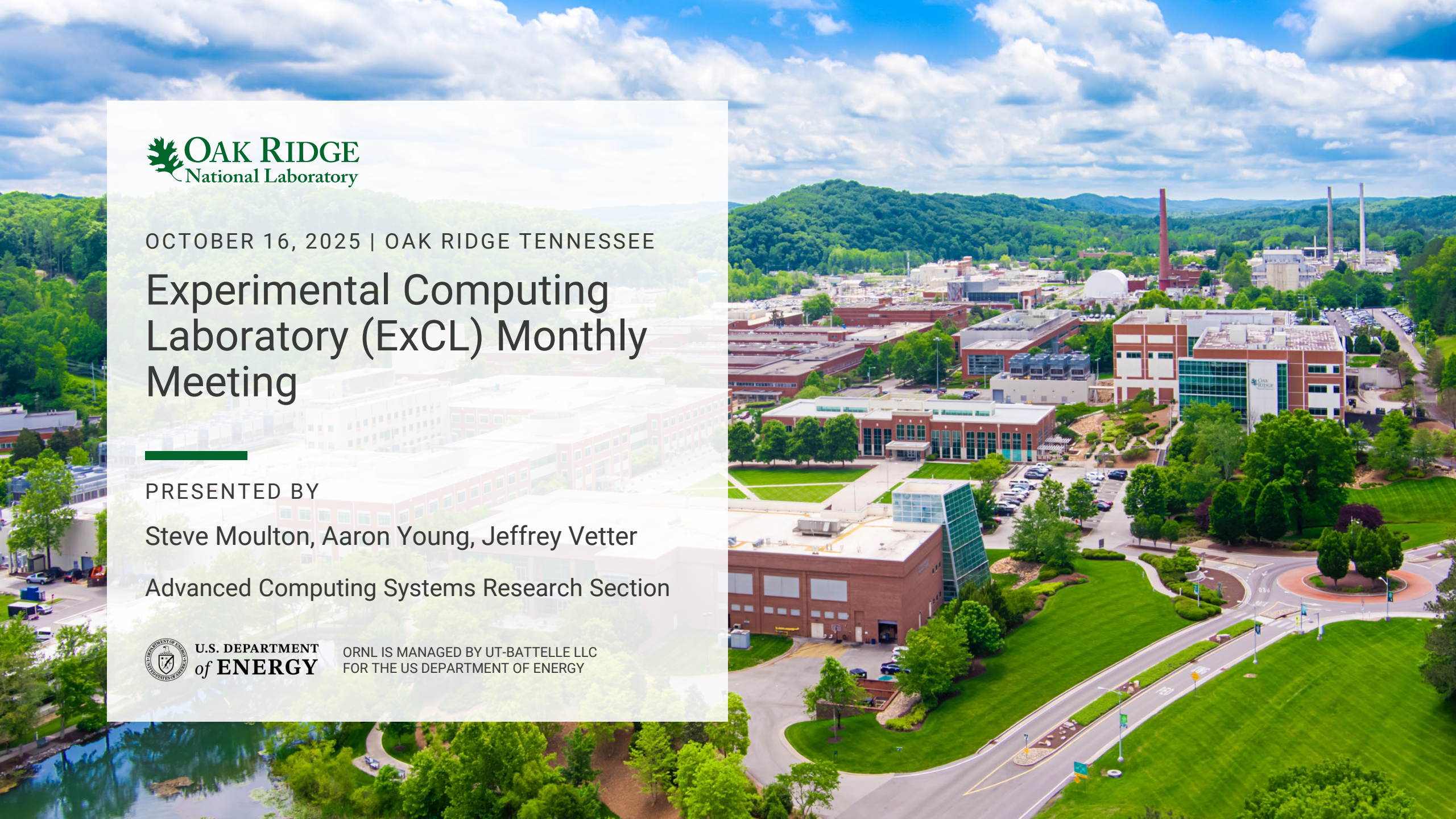


OAK RIDGE National Laboratory

OCTOBER 16, 2025 | OAK RIDGE TENNESSEE

Experimental Computing Laboratory (ExCL) Monthly Meeting

PRESENTED BY

Steve Moulton, Aaron Young, Jeffrey Vetter

Advanced Computing Systems Research Section

U.S. DEPARTMENT of ENERGY

ORNL IS MANAGED BY UT-BATTELLE LLC
FOR THE US DEPARTMENT OF ENERGY

New Hardware List and State (1)

Device	Use	State and Comment
AMD Versal VHK158 Evaluation Kit	FPGA development	In a box. User deployment. Standalone board.
AMD Xilinx VCU118 Evaluation Kit	FPGA development	ibid
Apple Studio M3 MAX	Software development and GitLab runners	Not deployed yet
GeForce RTX 5090 (Nvidia consumer grade)	Development and Analysis of software using GPUs	Awaiting deployment
AMD Radeon RX 9070 XT	Development and Analysis of software using GPUs	Card requires 775 watts. Will try to deploy in one of the Milans.

New Hardware List and State (2)

Device	Use	State and Comment
(2) GL-INET Comet KVM, ATX Power Control Board, and FingerBot.	Remote management of non-server class systems. Able to control power and push buttons.	Awaiting deployment
(2) Supermicro Hyper Server	Hypervisor replacement with redundancy	F&O Staff deploying today. Replaces six-year-old hypervisor
(4) PDUs for 5100/115 datacenter	Power distribution for rack mounted hosts in 5100/115	Work order placed. Will replace current PDUs (5) which are inadequate for task. Remote metering and control per outlet
ViewSonic 16” Touchscreen Portable Monitor	Easily deployed display for embedded system development	Shelf until needed
HP Intel-based high performance CPU system	Of interest to IRIS and potentially other projects	Initial deployment complete. No Intel GPU available yet. Awaiting B60 availability

New Hardware List and State - Networking

Device	Use	State and Comment
(2) Cisco C9216 Network Switches.	Core networking. 1) Deploy in 3700. 2) Deploy in K200 and put Arista switch in hot standby	Deployment requested for 3700. When this is done, we can proceed on development of this lab. Deployment not scheduled for K200 yet
Hubbell Rack Cabinet (lockable)	Secure enclosure for Cisco switch (required by ITSD networking).	Deployment requested for 3700

2026 and unavailable by deadline hardware requests

Device	Use	State and Comment
AI/LLM Desktop (Framework Desktop)	LLM Development	Does not ship until Q4 – missed EOFY purchasing deadline
NVIDIA DGX Spark (Grace Blackwell)	LLM Development and performance analysis	Just received four-day invitation to purchase – will work with purchasing to expediate
Tenstorrent Blackhole P100a	AI Accelerator	Awaiting availability – vendor will notify.
Tiny Pilot Voyager 2a	Remotely accessible KVM for remote administration of non-server systems.	May or may not get – other devices may fill the bill
SK Hynix AiMX card	Generative AI accelerator	Not available yet
Samsung Icebolt Memory	HBM3	Not available by purchase deadline
Intel B60 24 Gb intel arc pro	Intel-based GPU to be placed in Intel-based host for Intel/Intel development/performance analysis.	Not available yet

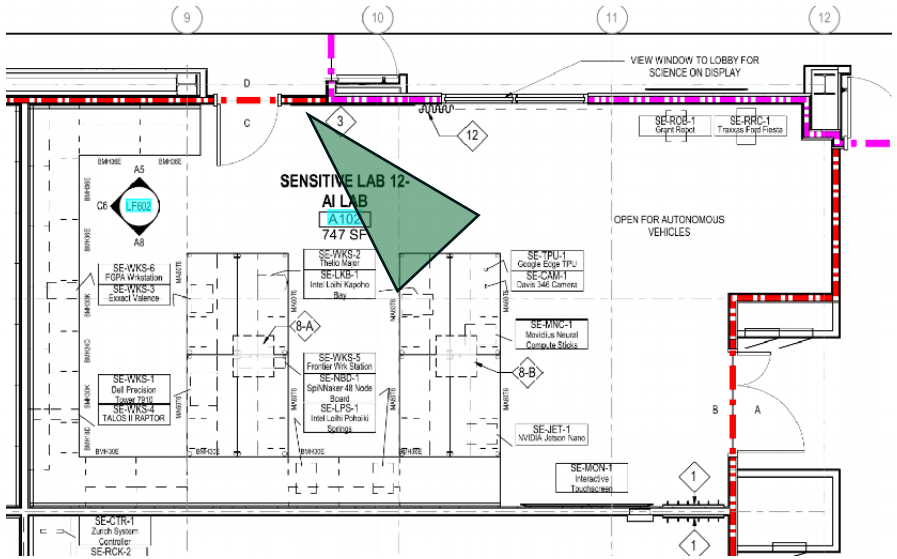
Don’t see something you need? Ask!

3700 (TRC - Translational Research Capability) Lab A102

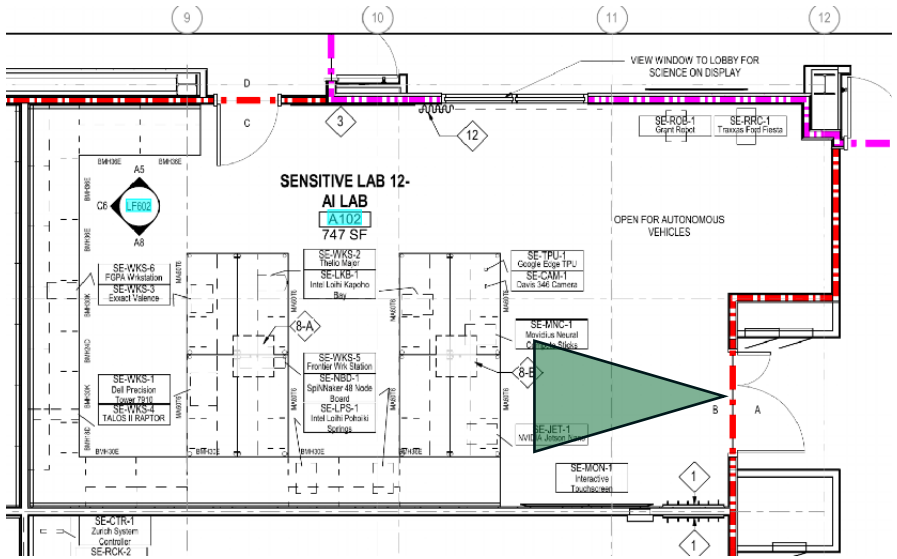
- This space will be used for embedded system and microelectronics development
- Will be on ExCL private network, with access to ORNL workstations network if needed
    - Before you ask – I have not tested the wireless LAN yet
- This will be a lab space with exposed power (but no more than 120v)
- RHACS compliance will be required. No admission (door enablement) without appropriate training

TRC Location

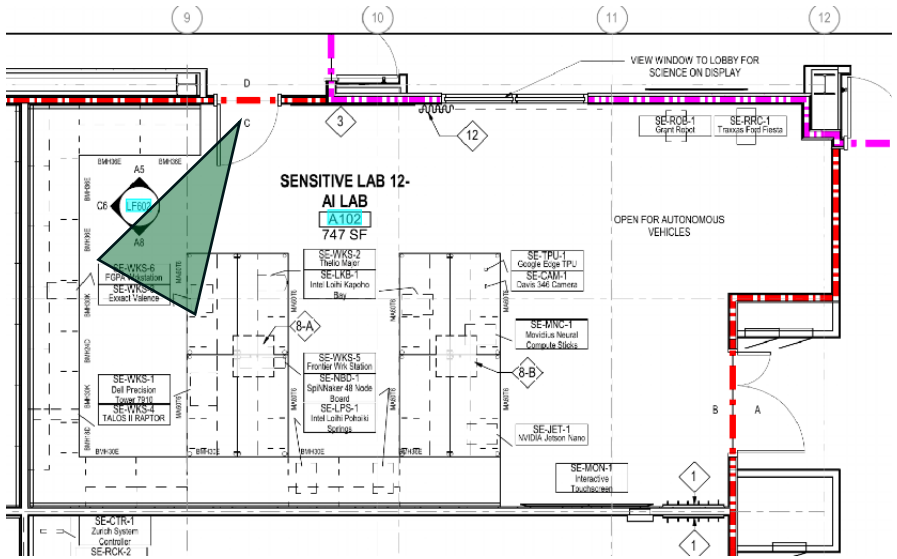
TRC A102 View Facing East



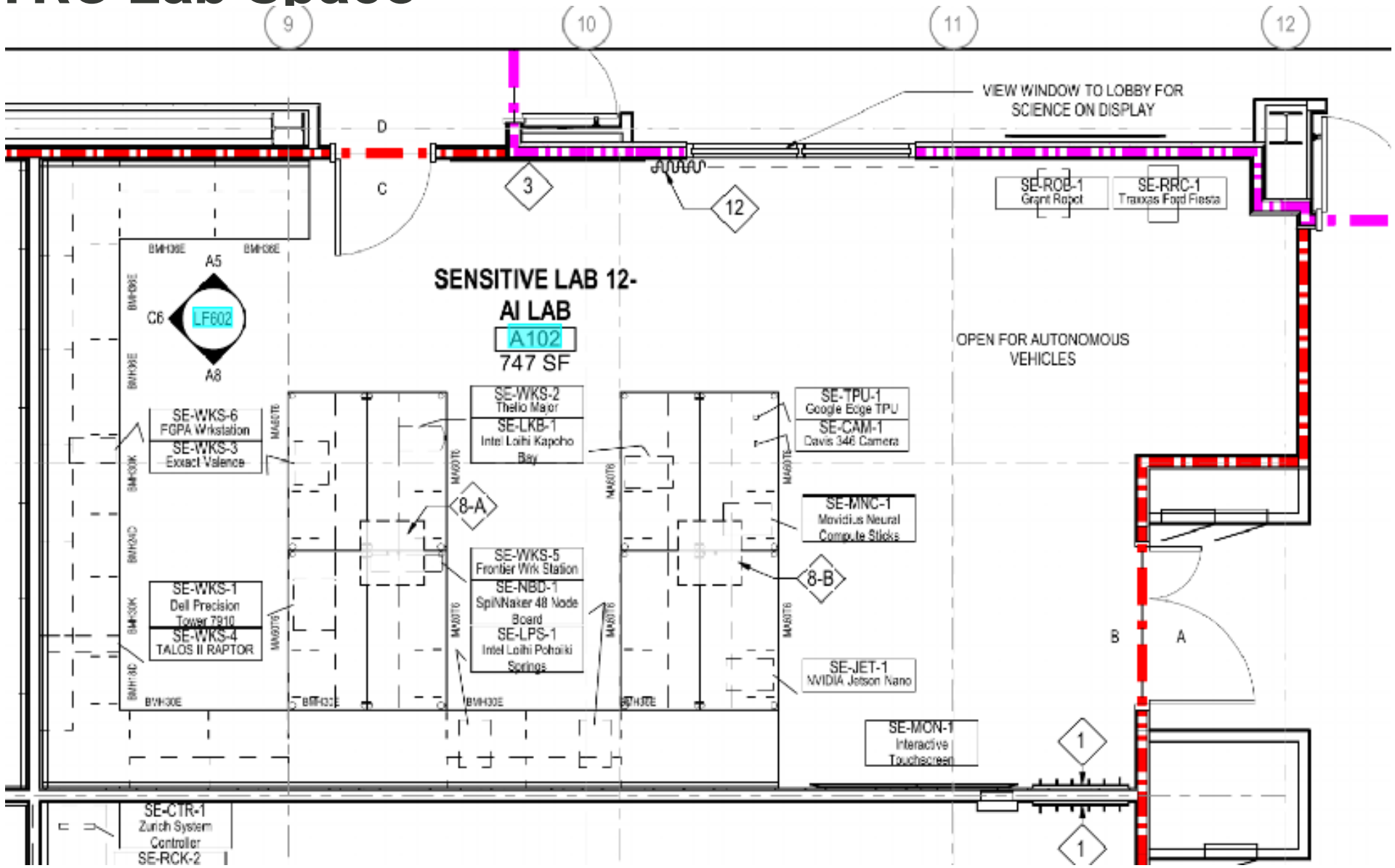
TRC A102 View Facing West



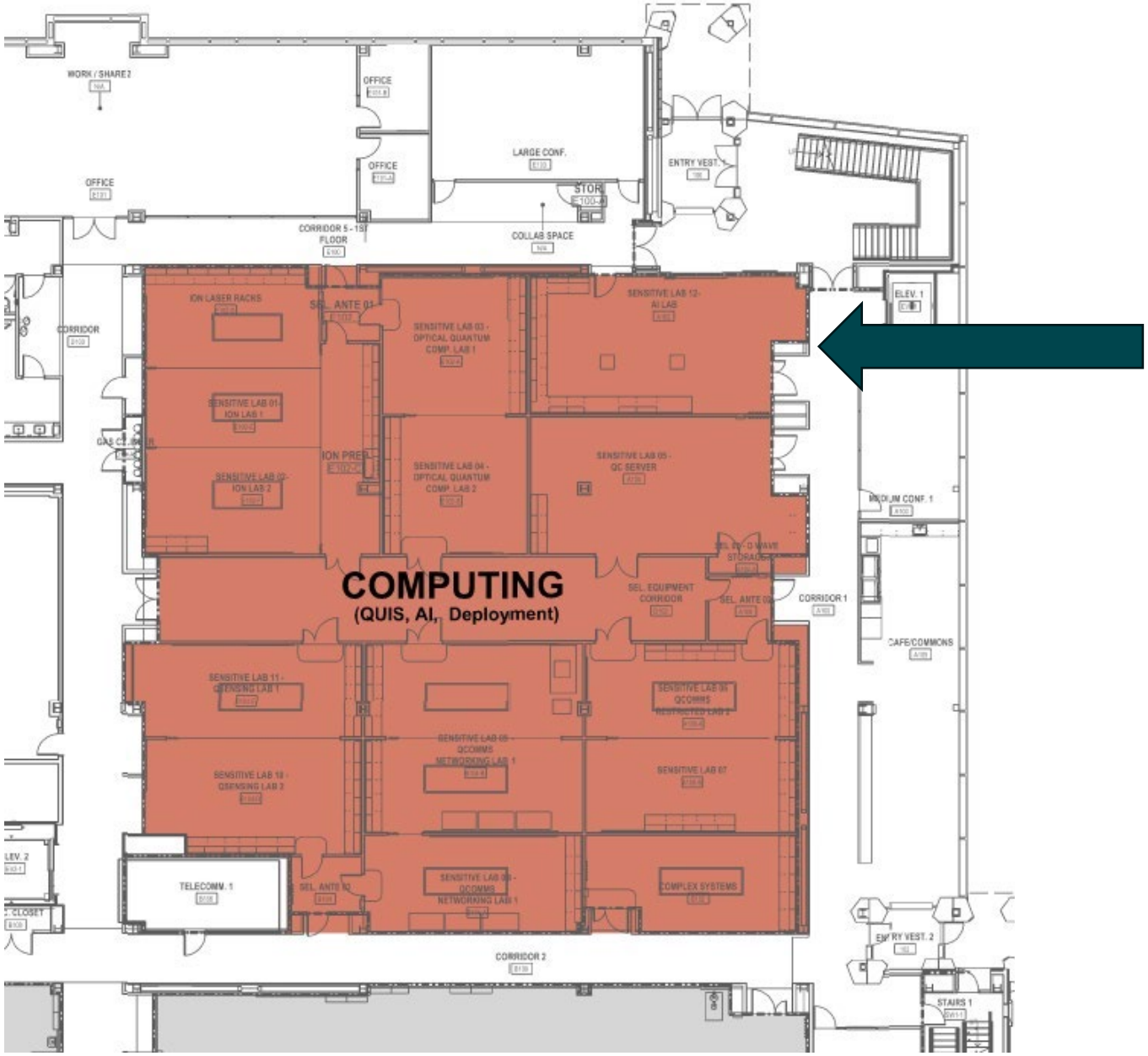
TRC A102 Workstations



TRC Lab Space



NB: Old slide. Workstation names are, in most cases, overtaken by events


COMPUTING
(QUIS, AI, Deployment)
WORK / SHARE 2
OFFICE
OFFICE
OFFICE
LARGE CONF.
ENTRY VEST. 1
STOR
CORRIDOR 5 - 1ST FLOOR
COLLAB SPACE
ION LASER RACKS
SEL. ANTE 01
SENSITIVE LAB 03 - OPTICAL QUANTUM COMP. LAB 1
SENSITIVE LAB 12 - AI LAB
ELEV. 1
CORRIDOR
SENSITIVE LAB 01 ION LAB 1
ION PREP
SENSITIVE LAB 04 - OPTICAL QUANTUM COMP. LAB 2
SENSITIVE LAB 05 - QC SERVER
MEDIUM CONF. 1
SEL. EQUIPMENT CORRIDOR
SEL. ANTE 02
CORRIDOR 1
CAFE/COMMONS
SENSITIVE LAB 11 - QSENSING LAB 1
SENSITIVE LAB 10 - QSENSING LAB 2
SENSITIVE LAB 07
TELECOMM. 1
SEL. ANTE 03
COMPLEX SYSTEMS
ENTRY VEST. 2
CORRIDOR 2
STAIRS 1

General Updates

- Slurm Accounting setup once more and Slurm config updated on Milan3 after FPGA was moved from Alveo mode to Bitstream mode.
- Account and Project request flows continue to be improved with automation to make the process more streamlined.
- There are now system specific notes in the boxed message of the day (MOTD) shown on every system. Suggestions about what other information might be presented per system (specialized hardware, etc) happily received.
- Remember to use the `news` command when you see new notices (which will show up in yellow in the MOTD). Outages, hardware changes and other issues will be found there. We keep this small and up to date.
- If you need solo access to a resource for performance measurement, or need additional storage space, do not hesitate to ask.

Gentle reminders

- Login.excl.ornl.gov is not for computation or compiling. It is a VM configured for ssh and thinlinc access only. Running large scale work on this host affects all other ExCL users
- Please don’t run VSCode on the login node either via Remote-SSH or ThinLinc. You can connect to a worker node via login as a jump host. Instructions at https://docs.excl.ornl.gov — Visual Studio Code | ExCL User Docs
- Remember that snapshots going back some time are available in ~/.zfs/snapshot (which will not show up on a normal directory walk). This is a read-only file system from which you can recover older versions of files. Snapshot names include date and time that snapshot was made
    - Hourly snapshots are kept for forty-eight hours
    - Daily (midnight or so) snapshots are kept for thirty days
    - Monthly snapshots are kept for six months

Questions Projects Comments Discussion Brickbats

- ~~GPS feed from roof?~~ (no takers) so this work not scheduled
- Look at power measurement at the host-, CPU- and APU-level
- Oscar will provide references for power monitoring on GPUs.

Expected heat dissipation of AI GPUs, according to KAIST and industry sources

Generation	Year	Total Power of GPU package	Cooling Method
Blackwell Ultra	2025	1,400W	D2C
Rubin	2026	1,800W	D2C
Rubin Ultra	2027	3,600W	D2C
Feynman	2028	4,400W	Immersion Cooling
Feynman Ultra	2029	6,000W*	Immersion Cooling
Post-Feynman	2030	5,920W	Immersion Cooling
Post-Feynman Ultra	2031	9,000W*	Immersion Cooling
?	2032	15,360W	Embedded Cooling