

Cryo-EM access at ETH Zurich: Managed booking system

Basic considerations:

1. The goal is to enable fair and efficient access to screening and frontiers Cryo-EM microscopes. Users who have suitable samples should have equal and equivalent access, keeping in mind that data collection time varies with the sample type and the scientific question to be addressed.
2. Frontiers instruments must be used efficiently and safely. They should only be loaded with samples and aligned by highly experienced users ("Titan operators").
3. Due to the complexity involved in data acquisition and the differences in the technical capabilities of the Titan Krios instruments and the differences in technical requirements of the various data collections, direct communication between Titan operators, planning and oversight by the cryo-EM hub must be at the core of experiment scheduling and data collection supervision.
4. In light of point 2, any system of user-based experiment scheduling (self-sign-up) at the Titan Krios microscopes must be avoided, as it has serious drawbacks:
 - It would significantly reduce efficiency in usage and scheduling.
 - It may result in suboptimal use of the instruments (wrong instrument for the job).
 - It is prohibitive of more complex or longer data collections, which are essential for certain projects / scientific questions.
 - It undermines the cryo-EM hub operation.
 - If sub-optimally trained users operate these frontiers microscopes, damage to the instruments may occur.

Optimal efficiency and fair measurement time allocation is achieved with the following rules:

1. All users approach the cryo-EM hub when they have a sample to be measured where planned data collection is entered in a sign-up list (see point 3 and 4). ETH groups and groups of ETH-associated PIs have priority access. Access for non-ETH groups can only be granted in case of free instrument and personnel capacity.
2. The hub director evaluates the technical feasibility of the planned experiments in collaboration with hub scientist. A Titan operator is assigned to the user's project:
 - a. The hub scientist collaborating on the project (collaborative projects enter a waiting list)
 - b. ScopeM or hub scientist in case the user got advanced training (see point 6)
 - c. Titan operator of the user's research group.
3. The cryo-EM hub advises/decides on a suitable data collection strategy and which microscope is to be used. The Titan operator together with the user estimates a target number of images, tomograms etc. to be achieved in a session, which is communicated to the hub director.
4. The hub director calls scheduling meetings and, in collaboration with Titan operators, establishes the schedule of the Titan Krios data collection (for the next booking period). Users are represented by their groups Titan operator, ScopeM Titan operator, or hub scientist. Data collections requiring similar technical setups can thus be scheduled back to back, to increase the efficiency of the instrument and reducing the chance of mistakes.

- a. In each scheduling period a Titan operator is allowed to reserve one session for a user.
 - b. A scheduling period should not exceed 4-5 weeks. If the time requested in the sign-up list exceeds this limit, the session length is reduced proportionally.
 - c. Exceptions of these rules can be granted by the hub director under exceptional circumstances.
 - d. The cryo-EM hub/ScopeM instrument responsible is granted sessions for microscope testing/maintenance in regular intervals.
5. Sample loading and microscope alignment can only be performed by Titan operators. The hub director and the ScopeM instrument responsible jointly determine who will be certified for these tasks.
 6. Data collection can only be performed by advanced users¹. The cryo-EM hub determines who will be certified after training provided by the cryo-EM hub.
 7. Session allocated in the scheduling meeting are entered accordingly in PPMS by the cryo-EM hub director and are thereby visible to all users for transparency².
 8. The cryo-EM hub director establishes statistics and reports to the cryo-EM steering board (and the VP research) in regular intervals.

Explanatory comments:

[1] DB: "Advanced users" are users that are trained to supervise data collection using automated data collection software (EPU/ SerialEM) and perform simple adjustment tasks that need to be performed repeatedly during the acquisition.

[2] DB: If for technical reasons the visibility of the sessions cannot be provided with PPMS the information about the schedule should be provided via an alternative database accessible on the ETH network to all users.