

Glacios Cryo-TEM

Sample screening and data acquisition for single particle analysis made easy

Adopt cryo-electron microscopy with improved ease-of-use and a high level of automation.

The new Thermo Scientific™ Glacios™ Cryo-Transmission Electron Microscope (Cryo-TEM) delivers a complete cryo-EM solution. It features 200 kV X-FEG optics, the industry-leading Autoloader for cryogenic sample manipulation, and innovative automation for ease of use, all bundled into a small footprint that simplifies installation.

Single Particle Analysis (SPA) workflow

In the SPA workflow, large numbers of identical particles (usually proteins or protein fragments) are prepared in an aqueous solution and then rapidly frozen into a thin layer of ice. The next step involves screening in the electron microscope to assess particle distribution and ice layer quality. Usually, several iterations of preparation and screening are required before the data acquisition on one or more high quality specimens can be started. Data, consisting of thousands of 2D projection images of the particles, are finally recombined into a 3D model, showing the particle structure in high resolution.

Key Benefits

Enhanced ease-of-use. Automated alignments and systematic user guidance allow easy SPA operation from one single interface (EPU).

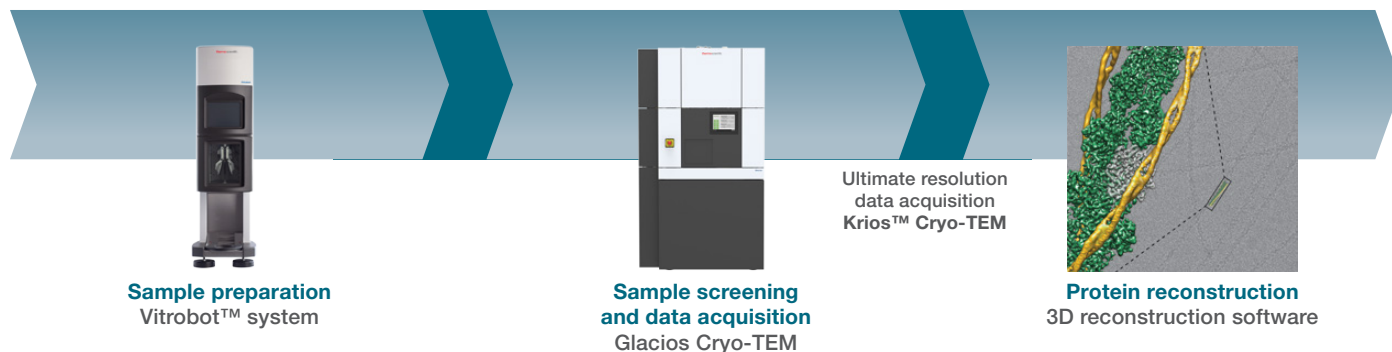
Small footprint. Compact hardware architecture, minimizing room and access route requirements.

Optimal tool performance. Self-assessment of microscope optical status, combined with automated alignments ensuring optimal experimental conditions are always available.

Workflow connectivity. Guaranteed compatibility allows robust and contamination-free transfer of samples between Autoloader equipped instruments (Krios, Arctica, and Glacios Cryo-TEMs).

Maximum throughput. Batch screening of up to 12 sample grids, creating overview atlases and classifying the ice films for guided selection of grid squares.

Tailored flexibility. Versatile system that can be configured for sample screening, SPA data acquisition, Tomography, or STEM applications.



Schematic representation of the Single Particle Analysis workflow. Thin cryo specimens are prepared in a Vitrobot, and subsequently transferred into the Cryo-TEM for screening and high-resolution data acquisition. Optionally samples can be transferred to a Krios for ultimate-resolution data acquisition. The microscope data consists of many 2D projection images of particles, which can subsequently be processed by reconstruction software, resulting in a high-resolution 3D model of the particle structure.

Sample screening and data acquisition

The Glacios Cryo-TEM is the ideal microscope for screening, prior to the transfer of samples to an Arctica or Krios Cryo-TEM for ultimate-resolution data acquisition. However, the Glacios Cryo-TEM can also be configured with a direct electron detector and/or Phase Plate to become a standalone SPA data acquisition solution.

Designed-in connectivity ensures a robust and contamination-free pathway throughout the entire workflow, and between different Autoloader-based Cryo-TEMs, without the need for manipulation of individual small specimen grids.

Small footprint

The new hardware architecture of the Glacios Cryo-TEM has been specifically designed to address the need for a smaller footprint and easier access path. In many cases, this avoids the additional investment and unwanted lab downtime for significant modifications to an existing infrastructure or the need for a purposely-built lab.

Enhanced ease-of-use through automation

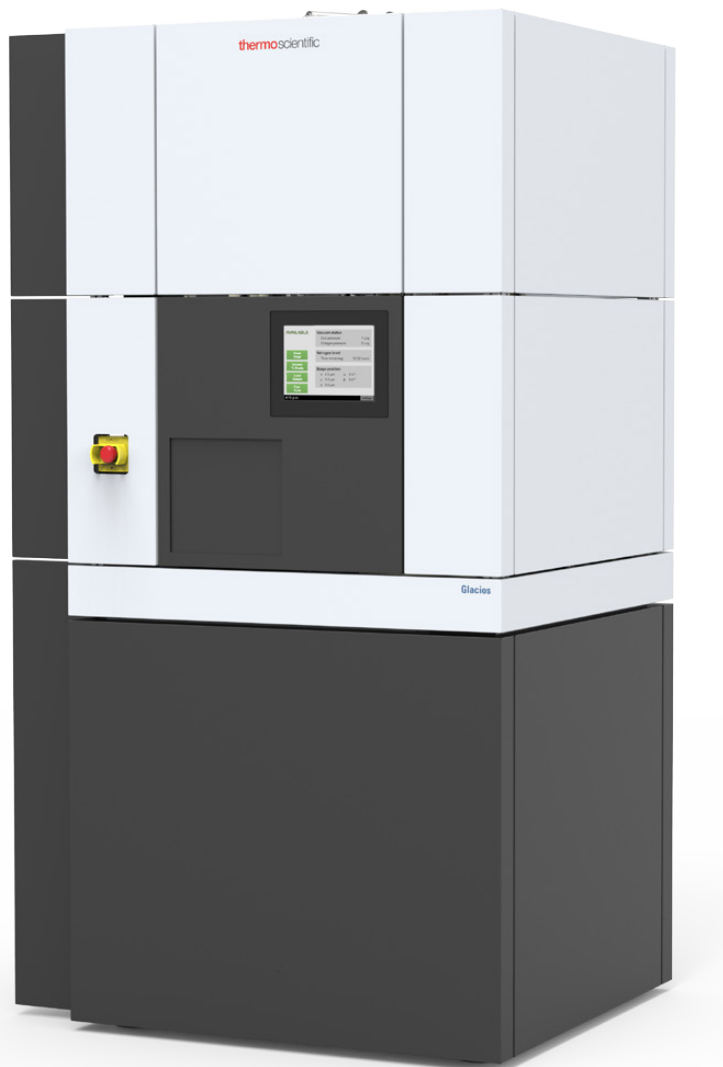
The EPU software has been further streamlined to become the single user interface for the SPA workflow, providing comprehensive user guidance, as well as access to automated routines for regularly recurring alignments.

Reproducible, optimal tool performance guaranteed

The optimal thermal and mechanical stability of the Glacios Cryo-TEM ensure perfect optical performance. The instrument features a self-assessment function that automatically evaluates the optical status of the microscope, providing feedback for any steps that require optimization. Additionally, automated alignment routines allow the instrument to be tuned to its optimal starting point for SPA or tomography experiments.

Maximum throughput

With full control of the Autoloader, all 12 grids in an AutoLoader cassette can be batch-screened: after the creation of a grid atlas, ice quality (presence, thickness) of the vitrified grids is automatically categorized to support the guided selection of grid squares.



Technical highlights

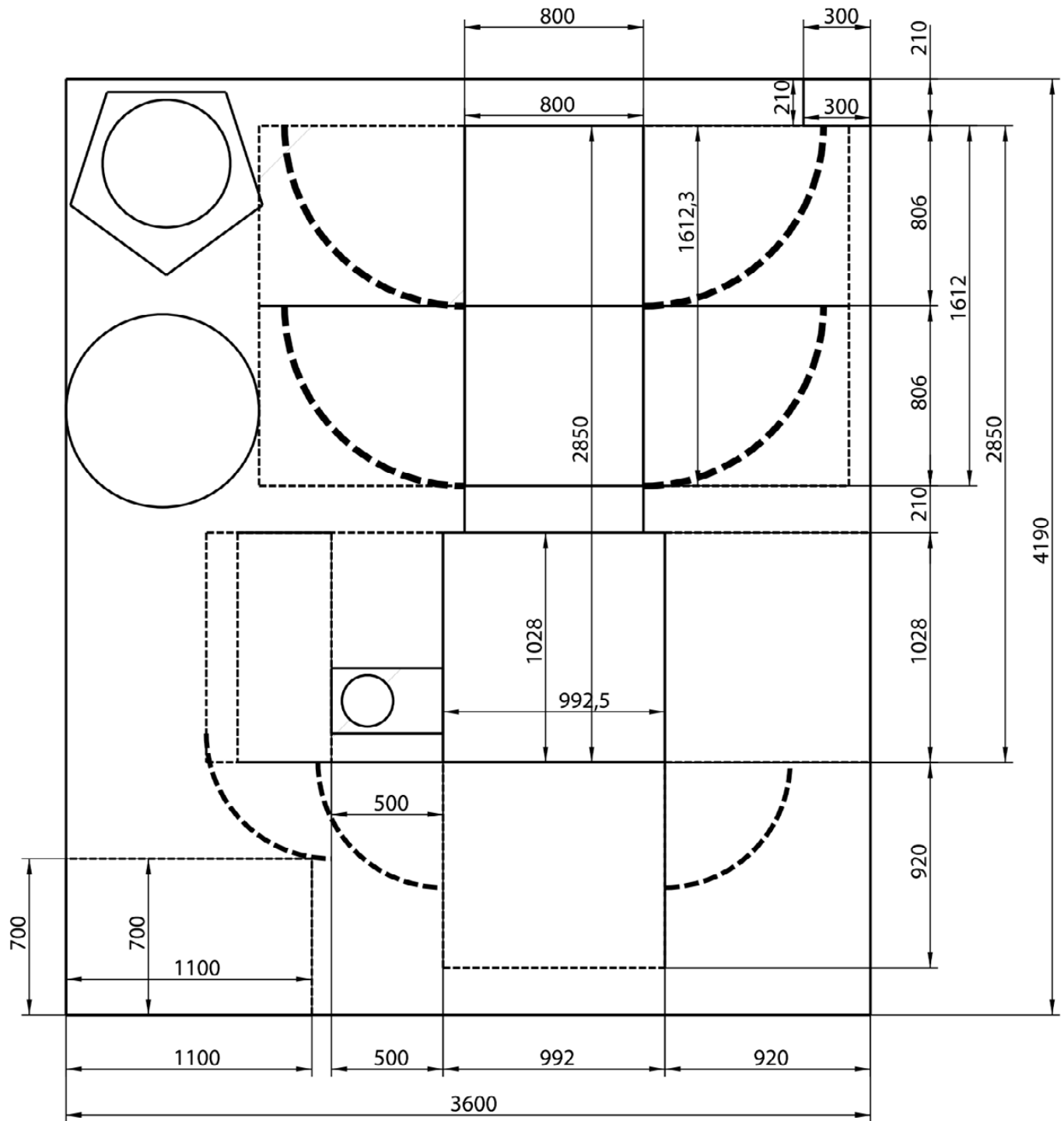
- High-brightness X-FEG electron gun
- Flexible accelerating voltage 80–200 kV
- Cryo-Autoloader for automated and contamination-free loading of cassettes, containing up to 12 AutoGrids
- Temperature management software, including liquid nitrogen autofill, and scheduling of cool down after cryo-cycle
- Automatic condenser, objective and SA apertures
- Computerized 4-axes specimen stage with $\pm 70^\circ$ alpha tilt
- Cryo-stage with single axis holder
- Symmetric constant power objective lens for minimizing image aberrations and lens hysteresis during mode switching between LM-SA-Mh imaging and diffraction
- Wide pole piece gap of 11 mm
- Rotation free imaging upon magnification changes
- Self-assessment of microscope optical status, combined with automated alignments ensuring optimal experimental conditions are always available
- EPU software for single particle analysis (SPA) screening and data acquisition
- Primary control unit including two 24" monitors to be placed within 10 meters from the column
- Digital FluCam: all manual and automatic alignments can be executed with the search and view camera
- Ceta 16M CMOS camera
- Windows® 7 Operating System
- Low Dose software suite for minimized electron dose during Cryo-TEM operation
- System enclosure

Optional Configurations

- Falcon 3EC™ direct electron detector
- Phase Plate solution
- STEM and TEM tomography SW
- HAADF STEM detector
- On-axis BF/DF detectors
- Vitrobot system
- Accelerate integrated service and application support packages to accelerate customer innovation and enhance productivity

Floorplan – Installation Requirements

- Environmental temperature: 18°C – 23°C
- Temperature stability: 0.8°C p-p per 24 hr (Compatible with air conditioning class ASHRAE 2001)
- Door height: 2.30 meter (can optionally be reduced to 1.67 meter)
- Door width: 0.90 meter
- Ceiling height: 2.80 meter
- Floor space need for microscope: 3.60 × 4.20 meter
- Weight distribution maximum: 700 kg/m²
- Double earth connection
- Frequency: 50 or 60 Hz ($\pm 3\%$)
- Compressed air supply with pressure range of 5–7 bar
- Nitrogen N₂ supply with pressure range of 1–10 bar
- Liquid nitrogen (LN₂) for continuous LN₂ filling
- Sulfur Hexafluoride (SF₆) gas in proper ventilated room
- LAN connection for Remote Access Program for Interactive Diagnosis (RAPID)



Glacios Cryo-TEM instrument footprint.

Find out more at thermofisher.com/EM-Sales