

Materials characterisation excellence through tool automation

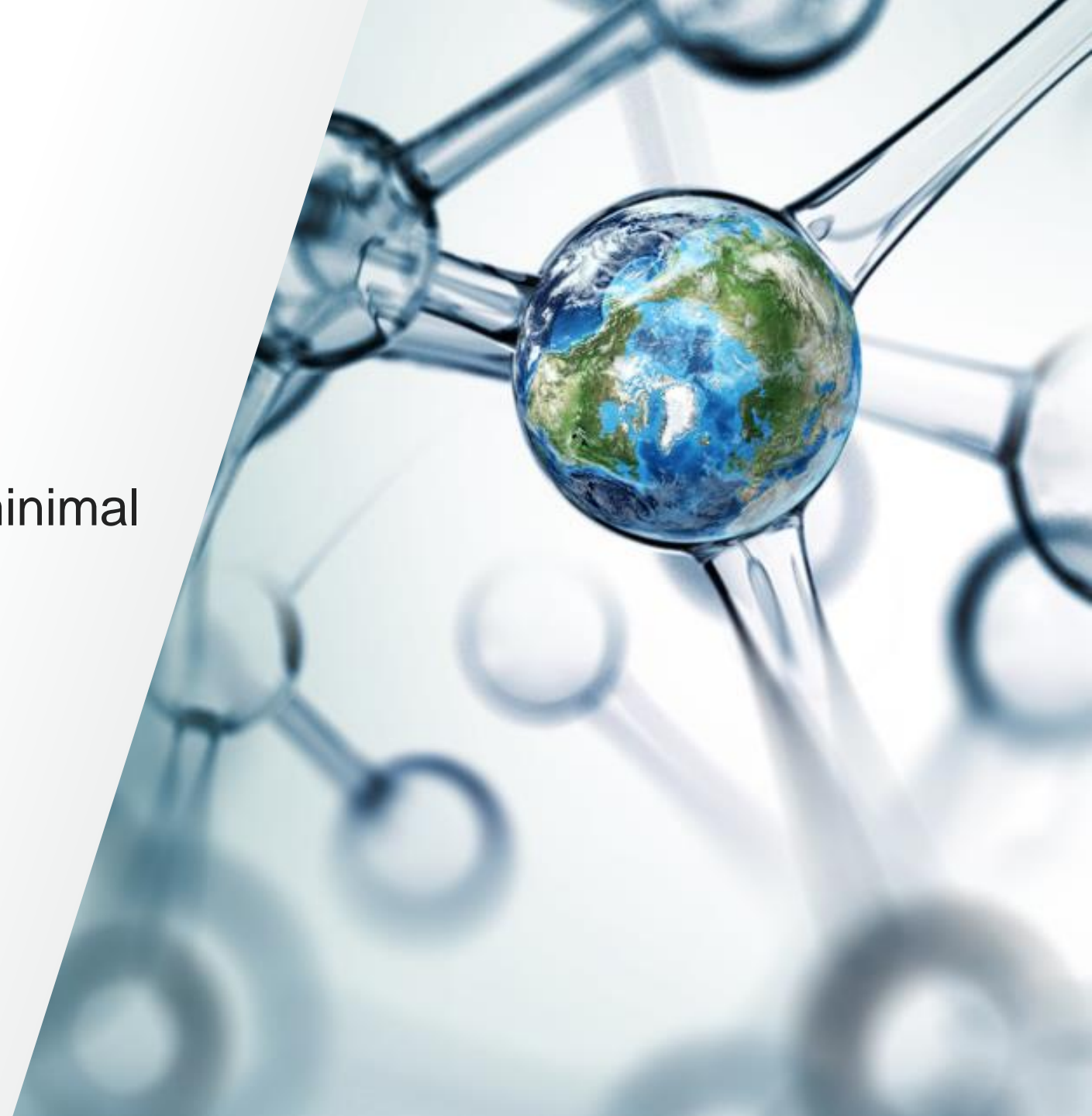
Achieve highest performance with minimal
effort using automated alignments

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 The world leader in serving science



Automation driving excellence

Not automation for automations sake..... automation driving better science



PRODUCTIVITY

- Throughput, more samples per day
- More data, statistical relevance, representative data
- Efficiency, 24/7 availability
- Designed to be always running

More Data



ACCESSIBILITY

- Speed to train users, complex tasks made routine
- Tools that are always optimised and ready to go
- Complicated experiments made easy with recipes
- Any place any time, remote access, full control
- Less manual tool intervention

A Better Way



CONFIDENCE

- Accuracy, the right answer
- Precision, reproducibility for process control
- Consistency, reproducible results every time
- Dependable user independent results
- Remove human factor errors
- Calibration for accuracy

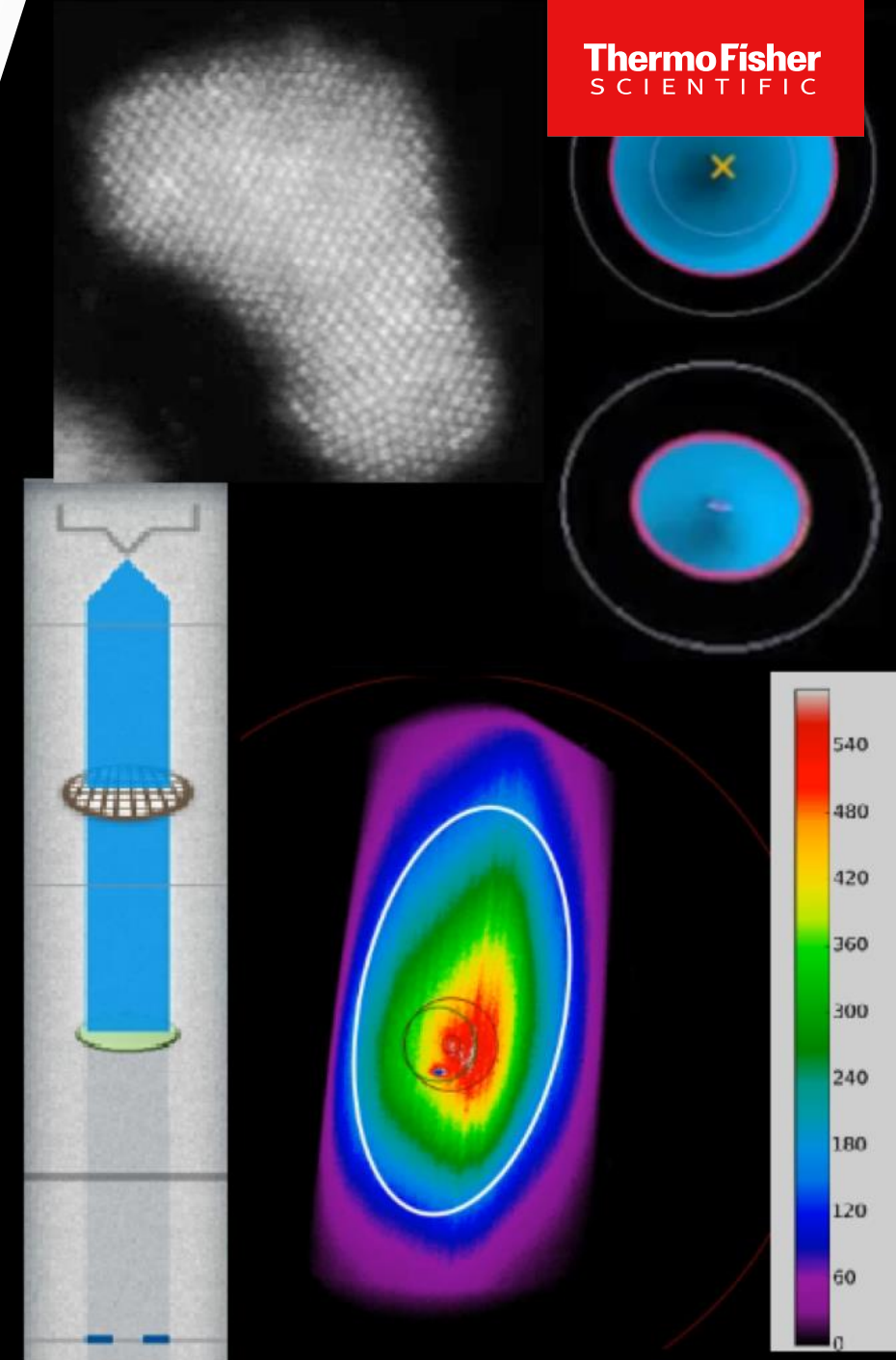
Reliable
Answers



BETTER SCIENCE

Overview

- Introduction
- Why automated and predictive alignments are so important
- Automation in floor model SEMs; Flash™ and SmartAlign™
- Automation in desktop SEMs;
- Automation in TEMs; Align Genie, AutoSTEM, OptiSTEM and OptiMONO



Introduction

Since their early development, electron microscopes are key to researchers and scientists



Philips XL series SEM



Why automated and predictive alignments are important

Different factors boost the electron microscopes usage



Automation for floor model SEMs

Less maintenance and alignments means more time for the real work

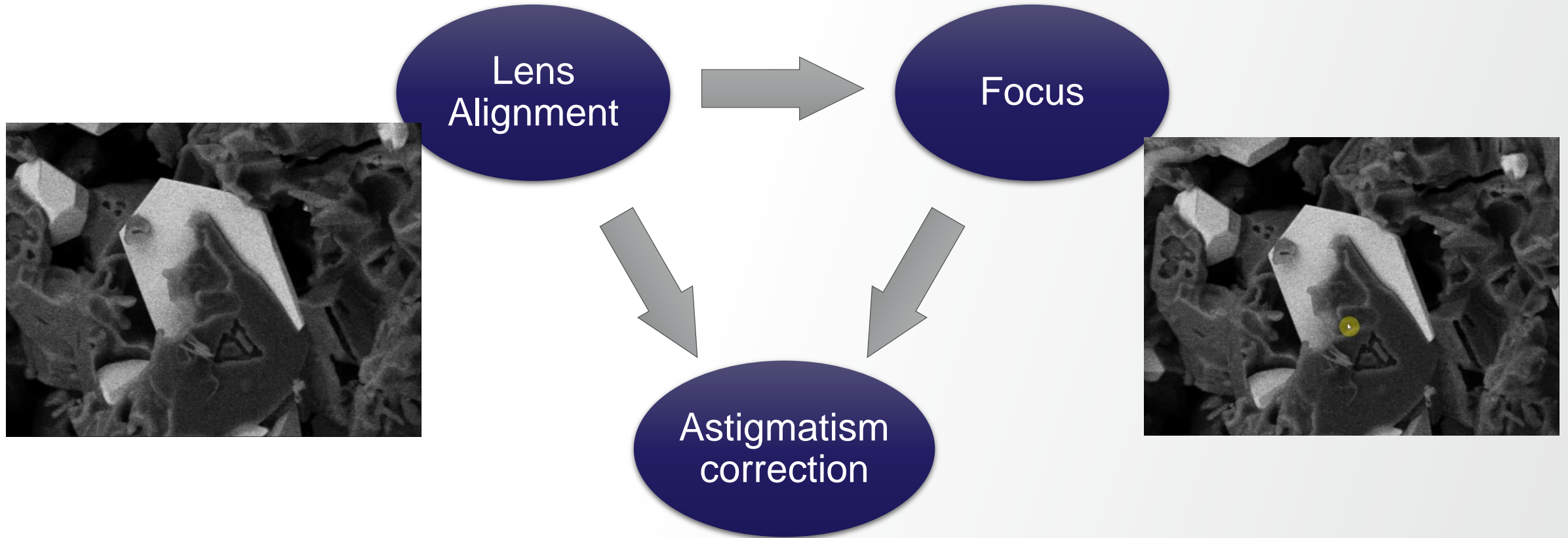
- **Flash™ Technology**
 - ✓ New and automated fine image tuning
 - ✓ Always optimized images

- **SmartAlign™ Technology**
 - ✓ Unattended automated alignments
 - ✓ Minimized maintenance



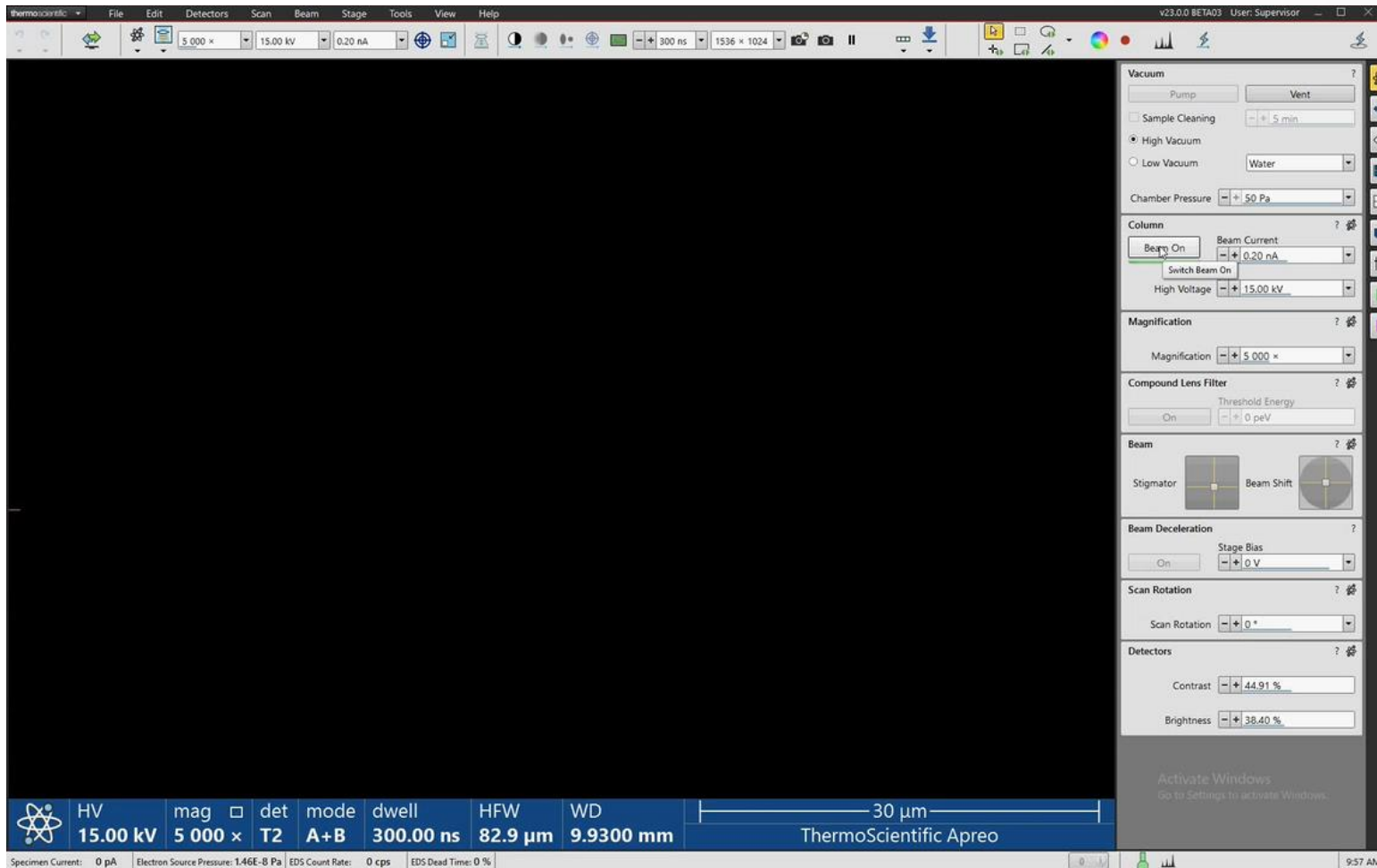
SEM alignments

Sometimes long and tedious for unexperienced users



Flash Technology

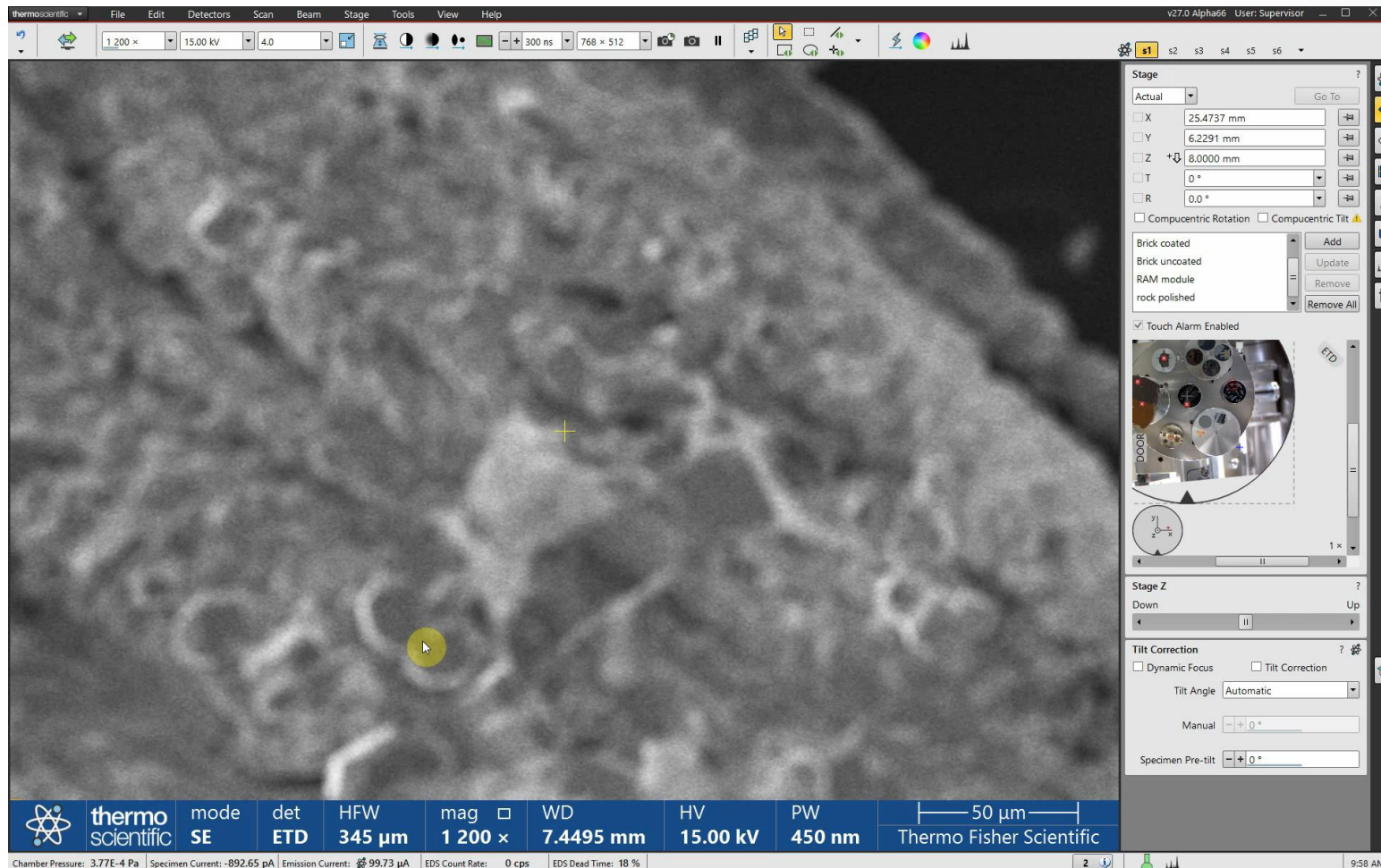
Easy image optimization, automatic lens align, astigmatism and focus adjustment



- Customized image tuning for a specific area of interest and imaging settings (accelerating voltage and beam current).
- Available with all detectors.
- Customizable Flash settings (steps to run, dwell time and image resolution) to ensure the highest-resolution results.

Alignment-free operation for improved productivity

Newly developed approaches for auto-functions for improved productivity



- Focus where you need with easy access to autofocus at any location in the field of view.
- Fast auto-functions for high quality imaging
 - Auto focus < 5 s
 - Auto stigmator < 5 s

SmartAlign Technology

Minimum effort to keep the system at optimal conditions

- Source shift
- Source centering
- Stigmator center
- Tip drift compensation



Run unattended (scheduled)

! Always aligned system

! Reduced yearly maintenance

- Source tilt



Run every kV or beam current change

! Minimized downtime

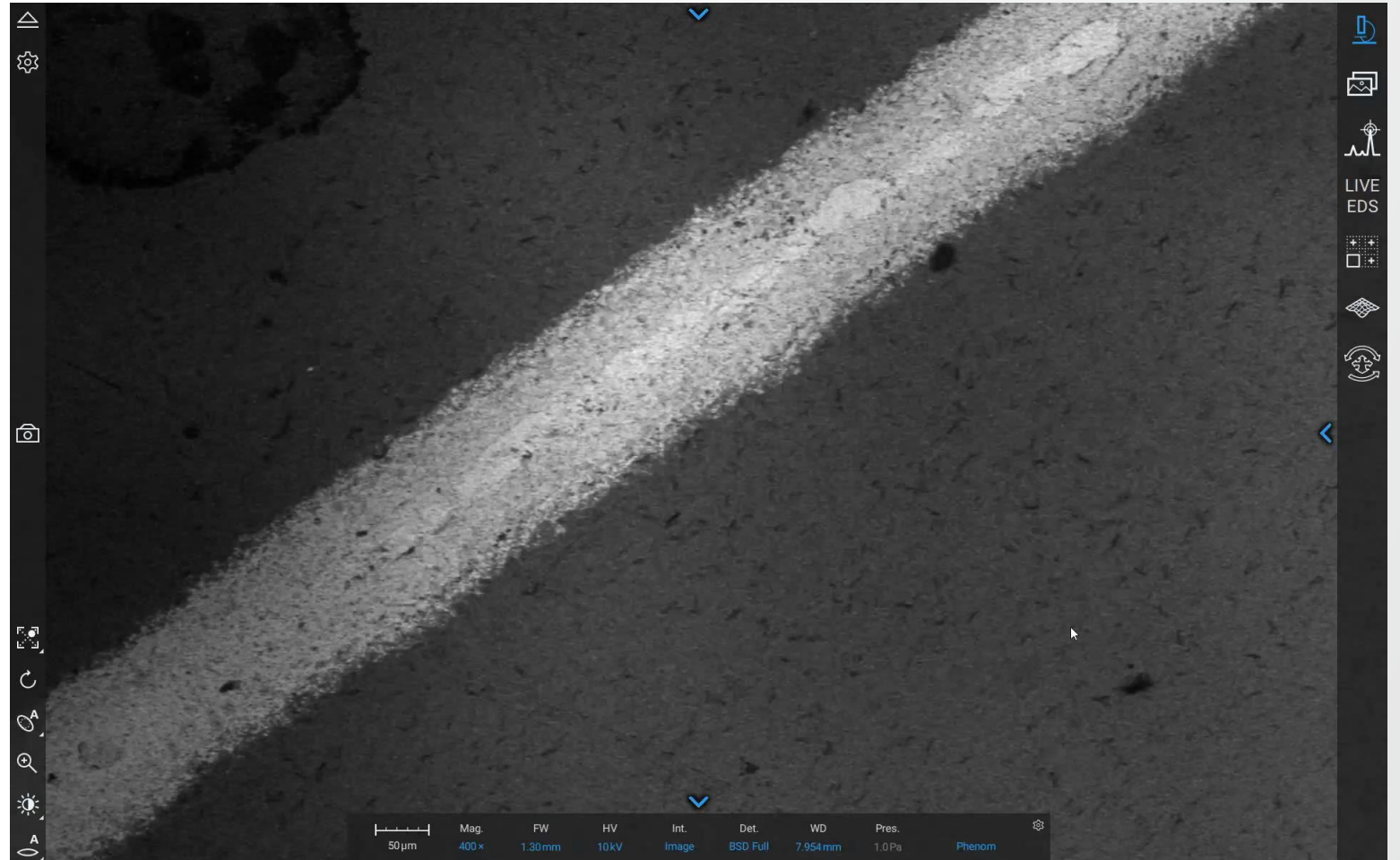
- Automatic software updates
- Self-diagnostic tools
- Guided maintenance (i.e., manual, videos)



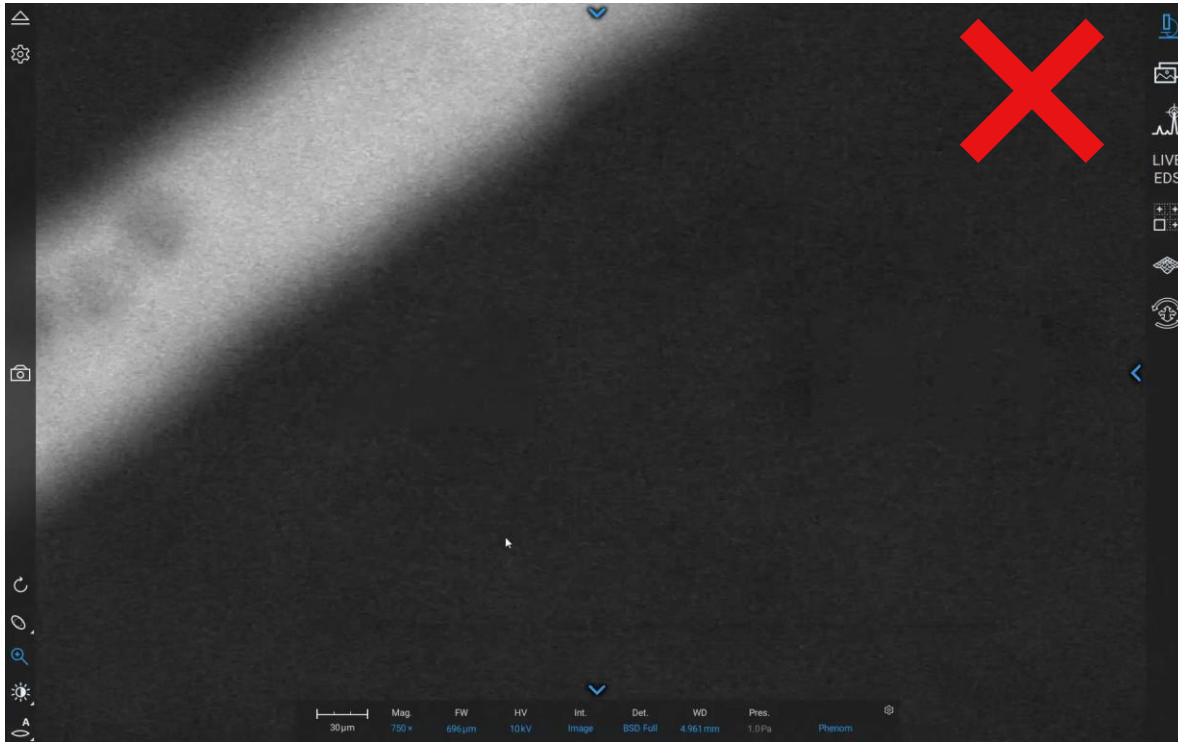
! Improved self-serviceability

Automation for desktop SEMs

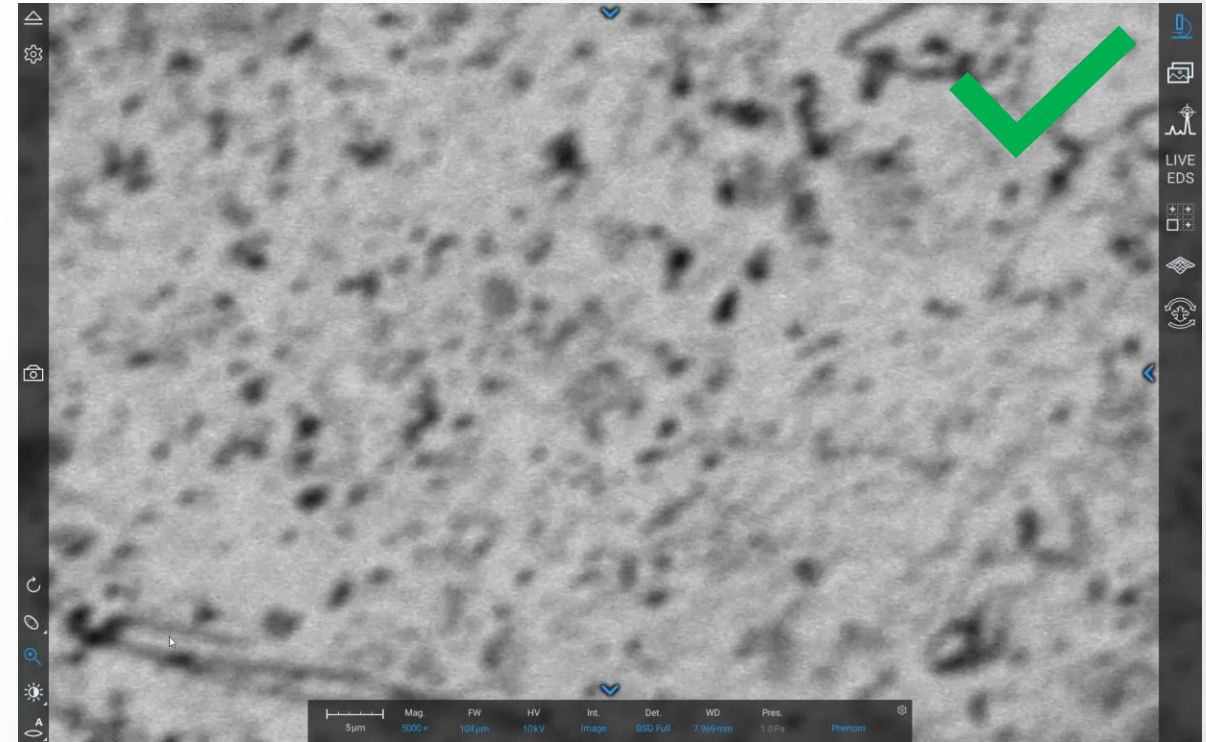
- Auto source tilt
- Auto focus
- Auto stigmation



Automation for desktop SEMs – Auto focus



Bad autofocus



Good autofocus

Automation for TEMs

- **Align Genie** ✓ Automated TEM and STEM tunings
- **AutoSTEM** ✓ Automated focus/astigmatism correction
- **OptiSTEM+** ✓ Automated aberration correction
- **OptiMONO** ✓ Optimal energy resolution and optimized monostigmation and focus

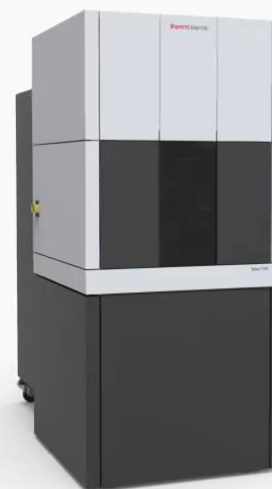


Align Genie

Align Genie aligns the microscope for you so that you can focus on doing experiments.

Align Genie

Talos alignment automation

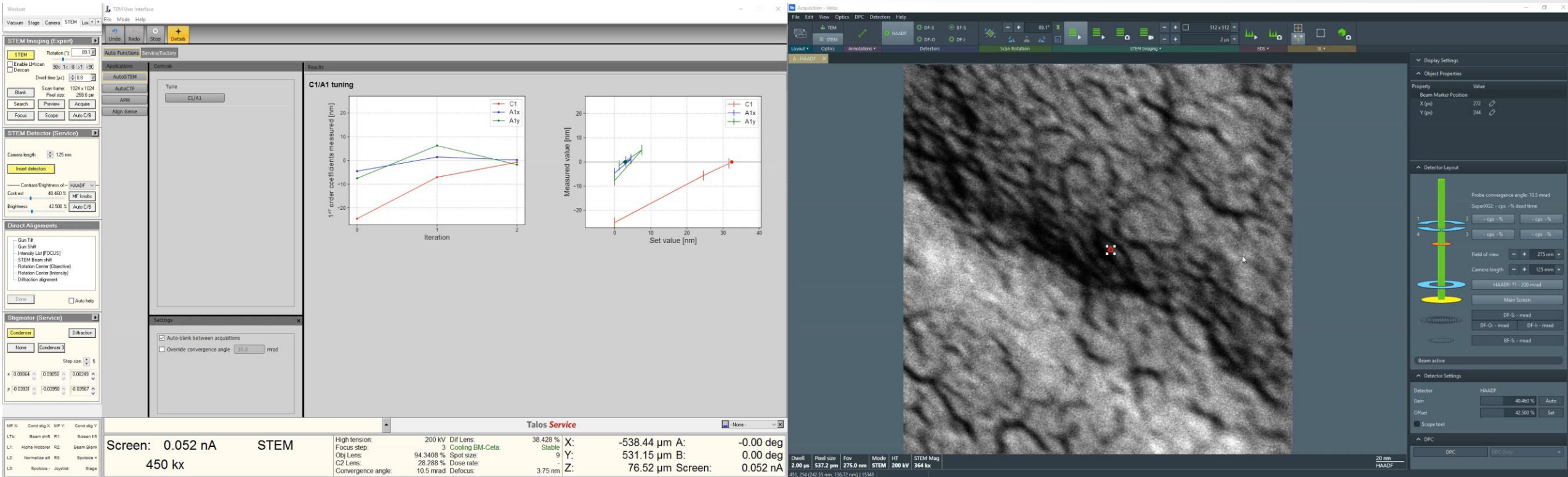


Talos F200i TEM



Talos F200X TEM
Talos F200S TEM
Talos F200C TEM

Automated alignment software for the correction of focus and astigmatism in STEM mode.



- Designed to work at STEM magnification up to 1 million
 - Fast and reproducible
 - Best foundation for HRSTEM
- Extremely useful for beam sensitive materials

OptiSTEM+

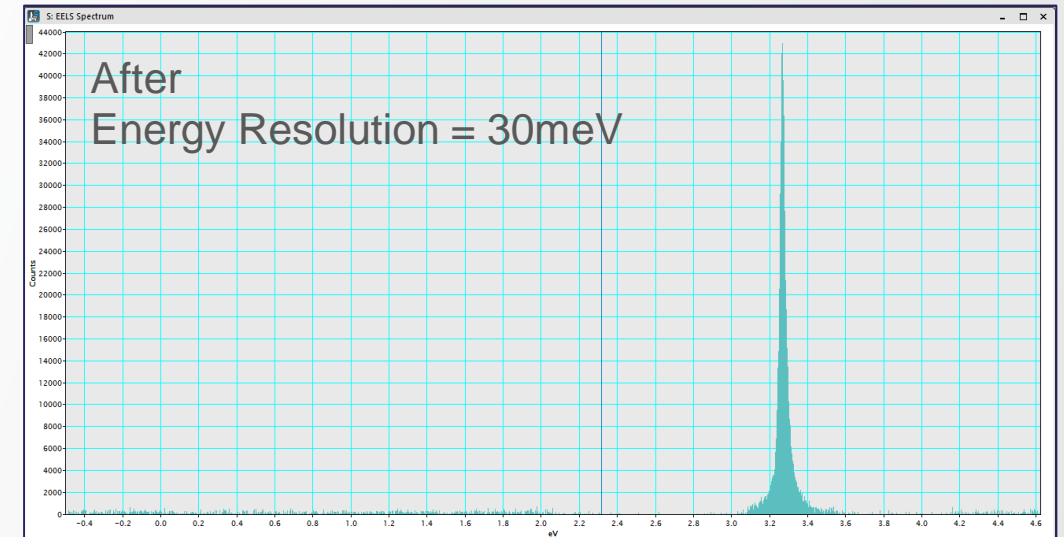
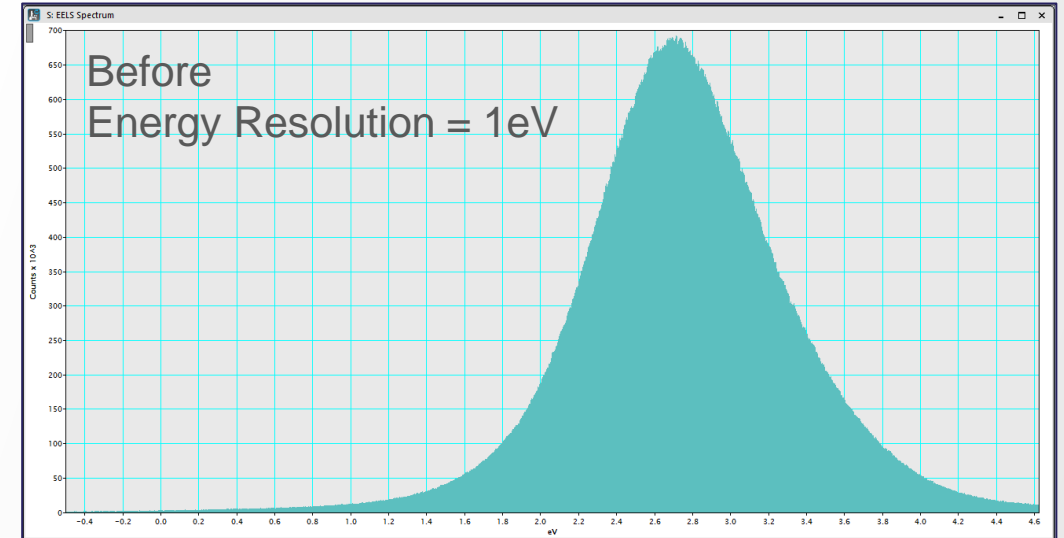
Automated, fast and reproducible aberration correction

- **Fast:** it provides the best correction of 1st and 2nd order aberrations (2-3 min) in the area of interest.
- **Better results:** provide the ultimate STEM resolution.
- **Reliable:** allows to achieve the ultimate resolution of the system in a wide range of acceleration voltages, between 60 and 300 kV.
- No more sample deterioration



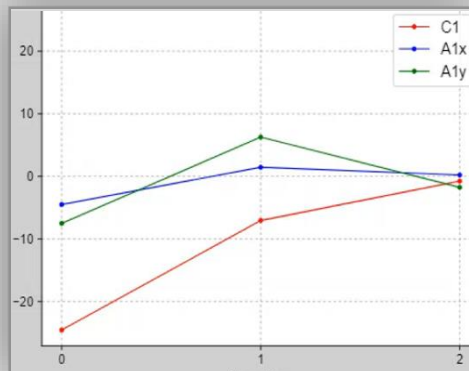
Provides the optimal energy resolution for a certain mono excitation and optimizes mono-stigmation and focus

- Turn on the monochromator
- Excite it by applying both magnetic field and electric field (higher strength of the field applied will give higher energy resolution)
- Automatic adjustment of the monochromator focus, stigmator X and Y
- GIF filter focus X and Y adjustment

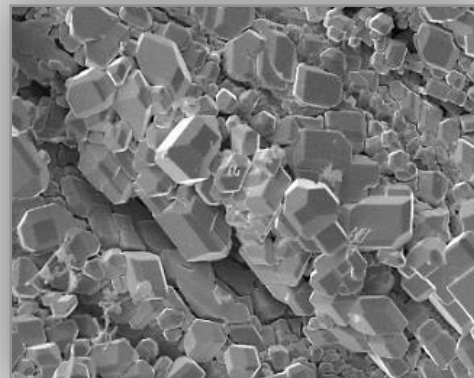


Not just a black box

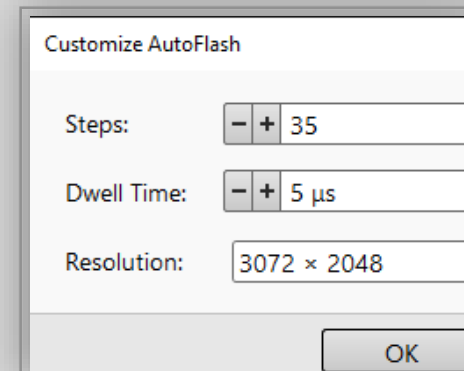
Automation that does not compromise understanding or education



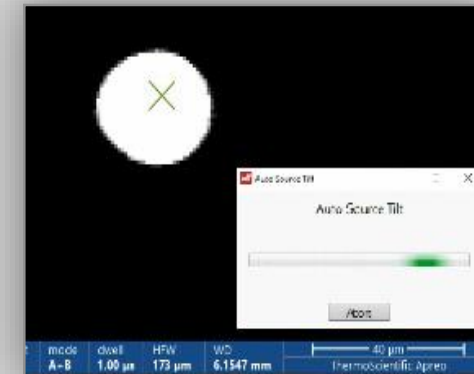
The status of each process is shown to make users follow its progress.



Full customization allows to adapt the functions to the area of interest, to the parameters in use –hence to achieve the best result possible for a wide range of applications.



Settings can be tuned to allow experts to have complete control on how they execute their functions.



Automated source alignments, diagnostics and software updates are not meant to exclude the users contribution but to keep the tool in optimal conditions and to guarantee a superior level of robustness.

Conclusions

How our automation solutions are supporting our users.....



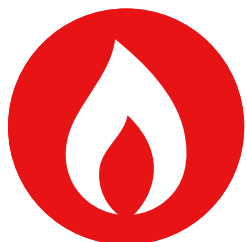
PRODUCTIVITY

- Saving on time-consuming alignments allows to process more samples.
- Alignment-free operation guarantee higher efficiency and the possibility to run long workflows overnight or over the weekend.



ACCESSIBILITY

- Tools are now available to users of any experience level.
- Tools are more accessible for remote work.



CONFIDENCE

- Improved reliability.
- Ready-to-go tools
- Optimized tools generate reproducible results.