

Release Notes

ZEISS ZEN 3.2 (blue edition)



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Original Manual

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New Modules

The following new software modules are available:

Module	Description
APEER (on-site) Basic & Advanced	<p>The new module APEER (on-site) allows to integrate and execute APEER modules locally and directly integrated into ZEN. Those custom modules can greatly enhance the ZEN functionality by adding additional image and data processing functionality.</p> <p>General features:</p> <ul style="list-style-type: none"> ▪ The APEER module must be downloaded first to execute it locally inside ZEN (internet connection is required). ▪ APEER (on-site) Basic allows to execute demo modules (only) in ZEN and is included in the basic package of ZEN system, ZEN pro, ZEN desk, ZEN lite, ZEN celldiscoverer and ZEN lattice lightsheet. ▪ Depending on the APEER module Batch execution is supported. ▪ All APEER modules and their execution can be scripted via Python to create advanced automated workflows. ▪ APEER (on-site) Advanced allows to use public and private modules inside ZEN.
EM Processing Toolbox	<p>New group EM processing: Toolbox of Image Processing functions for processing and artifact removal of EM image stacks.</p> <ul style="list-style-type: none"> ▪ Newly developed and only available with EM Processing Toolbox licence: <ul style="list-style-type: none"> – Coarse z-Stack alignment – Cut out regions – Enhance Local Contrast – Remove Stripes – Slices Replacement – Sort SmartFib Tiffs – Z-Stack equalization with ROI ▪ Available under EM Processing Toolbox or Advanced Processing license: <ul style="list-style-type: none"> – Not ▪ ZEN image processing functions included in base package (no license required): <ul style="list-style-type: none"> – Z-stack alignment with ROI – Change Pixel Type – Create image subset – Denoise – Gauss – Highpass – Median – Shading Correction

Module	Description
Counting and basic FCS	Replaces the previous module Counting. Features: <ul style="list-style-type: none"> Image acquisition in counting mode for internal GaAsP detectors, the cooled MA-PMT and BiG.2 with all LSM 980 configurations. 2+4ch Quasar and 2+32 ch Quasar must be equipped with optional counting electronics. Acquisition of Fluorescence Correlation Spectroscopy (FCS) with one channel (autocorrelation) providing one Fit model.
Counting Add-on FCS and FCCS	Extension for the module Counting and basic FCS. Features: <ul style="list-style-type: none"> Fluorescence Correlation Spectroscopy (FCS) and Fluorescence Cross-Correlation Spectroscopy (FCCS) for counting capable GaAsP-PMT and MA-PMT detectors. Single module analysis. Extended range of Fit models. Acquisition of spectral FCS/FCCS data.
FCS FCCS Add-on extended	Extension for the module Counting Add-on FCS and FCCS. Features: <ul style="list-style-type: none"> Global fitting for all data sets loaded Extended parameter sets for Fit models Ability to create own Fit models
FCS FCCS Add-on PCH	Extension for the module Counting Add-on FCS and FCCS. Features: <ul style="list-style-type: none"> Entry function to calculate number and brightness of molecule populations.

New Features & Improvements

Area / Module	Features / Improvements
General	Start-up time for ZEN has been streamlined and waiting times are greatly reduced. Rich text editor has been removed.
GPU performance indicator	Status bar displays the GPU usage with direct access to task manager.
Multi-scene images	Better handling of annotations in multi-scene image context for scale bars, container names, focus values etc.
Cut view	Cut view has been removed.
Graphics	Color Coded Projection can be annotated with a Graphic element and value information.
Focus strategies	Automatic selection of correct focus strategy, if Tiles dimension is available, without Tiles & Positions license.

Area / Module	Features / Improvements
Export/Import	Functions to import images of the XRM microscope: <ul style="list-style-type: none"> ▪ Import TXM ▪ Convert TXM Files to CZI
Processing tab	General improvements: <ul style="list-style-type: none"> ▪ New function in group Utilities: <ul style="list-style-type: none"> – Z-Stack Equalization with ROI ▪ Create a multi-channel reference image (Merge Channels) to be used as shading reference image in group Adjust: <ul style="list-style-type: none"> – Shading Reference From Tile Image
Analysis tab	Interactive Measurement: <ul style="list-style-type: none"> ▪ Measurement features grouped (as in ZEN core) in the setup dialogs: <ul style="list-style-type: none"> – Features Selection – Interactive Measurement Sequence Definition
Extension Manager	Now used for extensions only. ImageJ must not be activated anymore as it appears automatically on the Extensions tab.
Devices	Cameras: <ul style="list-style-type: none"> ▪ PCO.edge 4.2 bi Linkam cryo stage 196V3 supported for Cryo workflows. Colibri 5 and 7 with Filter wheel excitation 8-pos. mot. supported in MTB 2.17.0.14. Objectives: <ul style="list-style-type: none"> ▪ C-Apochromat 40x/1.2 W autocorr M27 ▪ C-Apochromat 40x/1.2 W Corr M27 (FCS & Airyscan) ▪ C-Apochromat 40x/1.2 W Corr M27 ▪ Alpha Plan Apochromat 63x/1.46 Oil Corr M27 Microscopes: Micro Toolbox MTB2011 version 2.17.0.14 Support of Cell Observer SD (no support of TIRF, DirectFRAP!)
Module Tiles & Positions	General improvements: <ul style="list-style-type: none"> ▪ Reworked Graphical User Interface <ul style="list-style-type: none"> – Clean separation of functions for finding/learning – Clear organization into 4 main functional areas: <ul style="list-style-type: none"> Manage objects and support points Tools selection bar and create object bar Overview & Navigate Display ▪ Short cuts for speedy addition of pre-set tile regions/positions via F9/F10 function key ▪ Improved 'stake' mode with display of added marks ▪ Automatic selection of most appropriate focus strategy for users without Tiles & Positions license

Area / Module	Features / Improvements
	<ul style="list-style-type: none"> ▪ Import of stage marks to Tiles position list via options drop down in tiles list/table ▪ Positions added in Advanced Setup visualized with the size of the image frame by default ▪ Copy and paste function works for any objects selected in the Advanced tile setup
Module Physiology (Dynamics)	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Performance enhancements (approx. 50x faster measurements) ▪ Minimized waiting times by intelligent handling and caching of data ▪ Smooth and responsive interaction with images, measurements, chartings and data tables ▪ Configurable layout of images and charts to optimize information display
Module Advanced Processing	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ New function in group Geometric: <ul style="list-style-type: none"> – Z-Stack Alignment with ROI
Module Intellesis	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Import of externally trained neural networks into ZEN blue: <ul style="list-style-type: none"> – Must be based on TensorFlow 2 – Training of models can be provided as a service via software SCS on request (extra costs) ▪ Download of pretrained UNets for Nucleus Detection is now available at: Model Downloads. ▪ Open-source Python package czmodel (https://pypi.org/project/cz-model/) to convert a TensorFlow2 model into czmodel to be used in ZEN for Image Analysis workflows. ▪ Option to 'hide' segmented pixels below a certain confidence threshold inside the Training UI for a guided labelling process.
Module Deconvolution	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ GPU performance indicator in status bar (while DCV runs): <ul style="list-style-type: none"> – Shows percent load similar to CPU load – Own traffic light right of the CPU traffic light – Double-click on the indicator opens the Task Manager to show more performance details <p>Note! This works only for Windows 10.</p>
Module Direct Processing	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Dimension order changed to All Slices per Channel as new default (while Direct Processing runs) ▪ Advanced settings for Deconvolution in Direct Processing: <ul style="list-style-type: none"> – Add Parameters from the PSF page, especially spherical aberration correction to the settings used in direct processing – Validation whether experiment settings match DCV settings

Area / Module	Features / Improvements
	<ul style="list-style-type: none"> – Allow channel specific settings for airyscan processing with direct processing ▪ Option to hide/deactivate AutoFilter when using method Airyscan. <ul style="list-style-type: none"> For 2DSR mode and 3D processing mode: option hidden and not activatable for images with > 1 time point, > 1 tile or > 1 Z-stack <p>Discovery proxy server available:</p> <ul style="list-style-type: none"> ▪ Automatically finding workstations in a network which can perform direct processing by listening to incoming requests ▪ First instance of ZEN in a network (configured as listening PC) is automatically acting a discovery proxy server.
Module 3Dxl	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Vision4DBridge: Sample pipelines available in the ZEN Applications tab "arivisVision4D". When opening and applying vision4D starts automatically with the selected pipeline together with the image loaded in Vision4D. ▪ New "Transparency" mode with dramatically improved transparency effect. ▪ Background colour black for: Volume, MIP, Surface, Mix. ▪ Background colour light gray for Transparency. ▪ Instrument specific threshold values in MIP mode: <ul style="list-style-type: none"> – 13% for WF images – 1 % for LSM ▪ Threshold Value for Volume mode: <ul style="list-style-type: none"> – 13% for WF images – 2% for LSM ▪ Slider allows to change mode settings. ▪ Former "Shadow" mode has been removed. ▪ New "Volume" mode: combination of the "old" Shadow and Transparency mode of ZEN 3.1 improvements in brightness and color.
Module ZEN Connect	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Data display in stage view (to upright the image and rotate all other images). ▪ Free tilting for all 3D stacks (ZEN Connect 3D add-on). ▪ Previous session alignment can be copied for a new session. ▪ Improvements for FIB workflows.
Module Guided Acquisition	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Optional selection of processing functions (to be executed after overview scan). ▪ Parcentricity correction of the detectors used in the Guided Acquisition experiments (for systems with multiple detectors). ▪ All settings (experiment, image analysis, processing) saved in Guided Acquisition folder to reproduce guided acquisition experiments.

Area / Module	Features / Improvements
Module Macro Environment	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ New processing functions in group Transformation.Geometric: <ul style="list-style-type: none"> – CoarseZStackAlignment* – ZStackAlignmentWithROI* ▪ New processing function in group Filter.Smooth: <ul style="list-style-type: none"> – RemoveStripes* ▪ New processing functions in group Adjust: <ul style="list-style-type: none"> – EnhanceLocalContrast* – SliceReplacement* – ZStackEqualization* ▪ ZenApeer functions have been extended with ZenApeer.Onsite (ZenApeer.Online remains) and offers the following methods: <ul style="list-style-type: none"> – GetModuleDescription – GetSampleModuleParameters – ListLocalModules – RunModule <p>* requires module EM Processing Toolbox</p>
Module Image Analysis	<p>General improvements:</p> <ul style="list-style-type: none"> ▪ Enable/disable chart as an option. ▪ Definition of default plotting type as part of the image analysis setting (histogram, scatterplot, heatmap). ▪ Definition of parameters to be displayed as part of the image analysis setting. ▪ Stage control from Analysis view to reposition analyzed objects. ▪ Histogram <ul style="list-style-type: none"> – Count of objects displayed for each bar – Export of datatables

2 Celldiscoverer Application

General Improvements

- Sample Carrier Template for Multislides contains a user-defined reference position for correct bottom thickness and material measurement
- Autoimmersion is activated per default

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