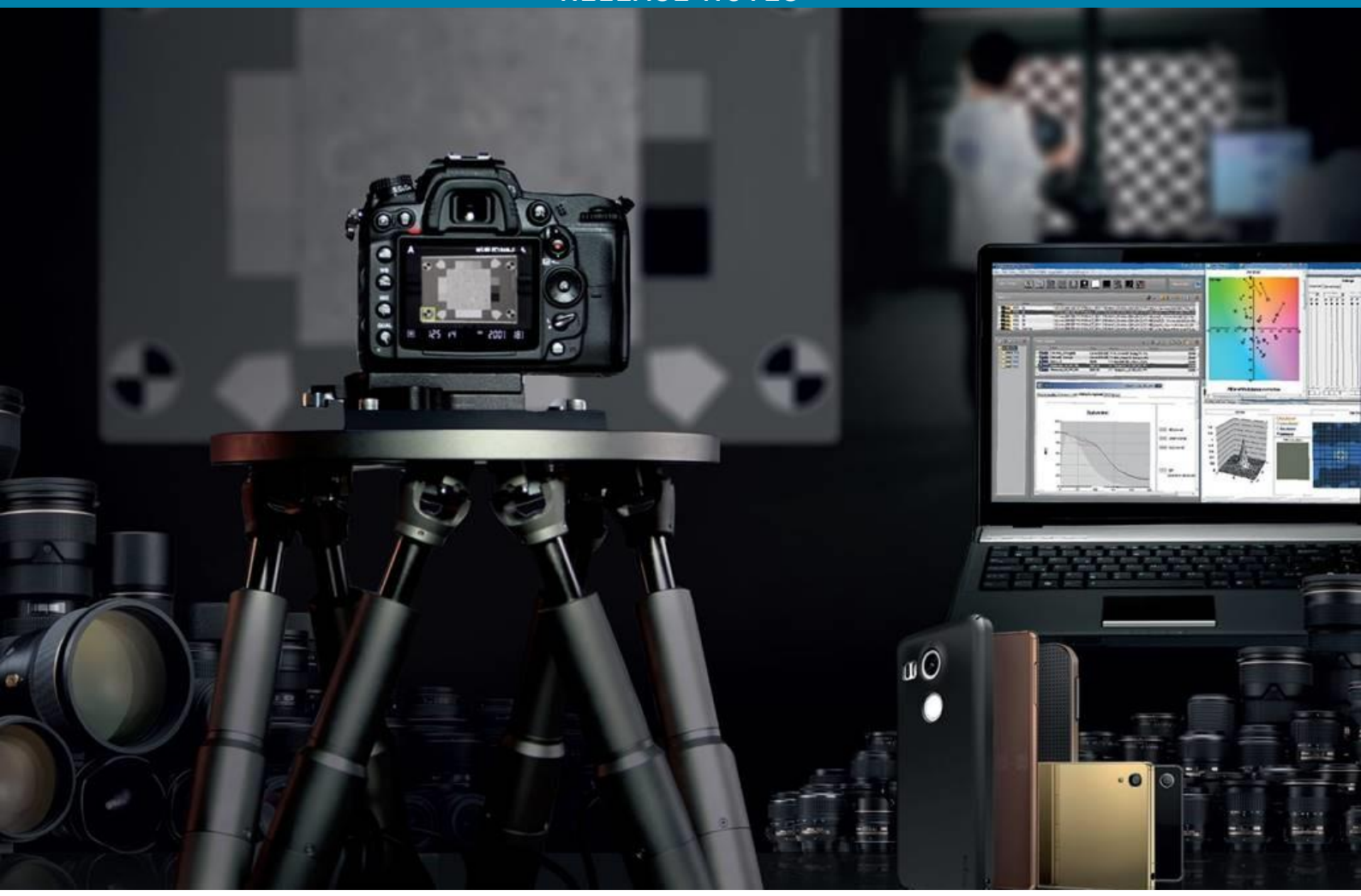
ANALYZER

by DXOMARK

V9.1.2

RELEASE-NOTES



Analyzer solution includes everything you need to reliably measure and analyze the imaging performance of any type of image capture device: testing protocols and methodologies, laboratory specifications and installation guidelines, data management and analysis software.

Analyzer is the only solution that can fully measure not just the quality of captured images, but also artifacts from electronic shutters, the effectiveness of 6-axis image stabilization systems, the geometry of dual-module cameras for 3D or stereoscopic vision, and the dynamic response of imaging devices to changing scenes and light levels. Coupled with Analyzer's ability to measure images the way consumers see them, it is possible to fully evaluate cameras and lenses in a way that predicts how they will perform in real world situations.

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1 - Software Installation

1.1 Analyzer & Workflow Manager Installation

We recommend using the final user account to install the software.

Starting from Analyzer 8.3, the entire suite is available as a unified installer. In 9.0, the installer will install the Analyzer application suite, the Workflow Manager Python libraries, the AZ Photo and AZ Video analysis applications and the LabManager lab equipment control service and user interface as well as all the necessary documentation and API references.

An installation manual is available alongside the installer, which describes in detail how to install these different components.

This manual also shows how to handle Workflow Manager installation without Internet connection, as well as some troubleshooting instructions, including how to verify if software components were successfully installed.

1.2 First launch and license

Once Analyzer has been installed, you can follow these steps:

1. Plug in the Analyzer USB dongle if you have one.
2. Launch Analyzer.
3. If a license is required, a license dialog will appear that will let you request a license code from Support team.
4. Copy-paste the code you receive into the [Set license…] dialog.

Contact support support.analyzer@dxomark.com if code registration fails or if you did not receive your license.

2 - Analyzer 9.1.2

2.1 Breaking changes

2.1.1 Protocol Automation Camera v6 replaces Protocol Automation Camera v5 and selfie

Analyzer 9.1.2 provides the Protocol Automation Camera v6 scripts in Workflow Manager (Python API). The Protocol Automation Camera v5 and Selfie are no longer available.

Please refer to the Workflow Manager inline documentation and Protocol Automation setup guides for additional details.

To continue using Protocol Automation Camera v5 and selfie, please remain on Analyzer v9.1.1.

2.1.2 Removal of unused methods in Lightmeters interface in LabManager

`set_range` and `set_unit` methods were removed from the Lightmeters interface as they were not used.

In the `config.json` configuration file, the “gossen” entry is removed.

Supported Gossen lightmeters (MavoLux and MavoMaster) are now always setup in autorange mode, with the unit being in lx (or cd/m2 if the attachment is screwed on).

2.2 New features

2.2.1 Setup: AFHDR Portrait 

2.2.1.1 Measurement and aggregation available in SetupPhotoAfhdrPortraitEugene and SetupPhotAfhdrPortraitDiana

In analyzer 9.1.1 the mobile protocols gained the ability to automate shooting the AFHDR Portrait setup. In 9.1.2 they can now also perform automatic measurement and aggregation.

Please refer to the Workflow Manager inline documentation for `SetupPhotoAfhdrPortraitEugene` and `SetupPhotoAfhdrPortraitDiana` for additional details.

2.2.1.2 VideoAfhdrPortraitMeasure

This new measurement performs the AFHDR Portrait analysis on videos using the AFHDR Portrait setup. The analysis includes the following measurements:

- Timing measurements

- Exposure on face
- Local Contrast Gain measurement
- Face detail preservation measurement
- Visual Noise measurement

Please refer to the Workflow Manager inline documentation for additional details.

2.2.1.1 New Protocol Automation SetupVideoAfhdrPortrait

In addition to the new measurement VideoAfhdrPortraitMeasure, a new protocol automation setup has been made available to automate shooting perform the measurement and compute the aggregation of results.

Please refer to the Workflow Manager inline documentation the related Protocol Automation setup guide for additional details.

2.2.2 HDR metrics and measurements support 

2.2.2.1 ISO 21496-1 gain map support

HEIC, HEIF and JPEG files following ISO 21496-1 encapsulation of HDR gain maps are now fully supported.

2.2.2.2 Gain map handling for devices from Apple iPhone 14 and below using iOS 18.x

Images from Apple iPhone 14 and below using iOS 18.x are fully supported.

2.2.2.3 Basic support to save HDR images as AVIF

Images (inside `dxomark.corewrappers.Image` objects) can be saved to AVIF files. This method supports saving HDR images with ITU-T H.273 Coding Independent Code Points (CICP) colorimetry metadata. For more detailed information, see the inline help of the `Image.saveImage` method.

2.2.2.4 Automated adaptation of the white point luminance inside measures

It is now possible to activate automated adaptation of the white point luminance to the exposure of the chart inside several measures:

- **`VisualVideoNoiseMeasure`**
- **`VisualNoiseMeasure`**
- **`TextureMeasure`**
- **`AutofocusHdrMeasure`**
- **`AfHdrPortraitMeasure`**
- **`SingleImageHdrMeasure`**
- **`CompositeHdrMeasure`**
- **`CloseUpTextureNoiseMeasure`**

- `VideoAutofocusHdrMeasure`

This is controlled in all these measures using three new inputs:

- `ExposureCorrection`
- `ExposureCorrectionPatchIndex`
- `ExposureCorrectionTargetLightness`

This automatically determines a value for the `WhitePointLuminance` parameter (which cannot be used together with these options), which is particularly useful for images where the observer would be expected to have an adaptation state far from an average SDR display: this includes HDR images, or SDR images that are heavily under- or over-exposed.

For more detailed information, see the inline help in each measurement.

2.2.3 New ForceMarkerDetectionOnEveryFrame feature for video measurements 

Now you can use “ForceMarkerDetectionOnEveryFrame” input in video measurements. When set to False, the measurement performs marker detection on every frame using local search around the last known position from previous frames when available. The processing time is short. When set to True, the measurement performs full marker detection without a priori knowledge of the approximate position of the markers. The process takes more time but enables detection of marker when there is large difference in positions between frames.

2.2.6 Instrument control

2.2.6.1 Gossen MavoMaster support in LabManager

Added support of Gossen MavoMaster lightmeters in LabManager, on top of already supported Gossen MavoLux devices. Control is transparent through the Lightmeters interface using the Python API or the LabManager UI.

2.2.6.2 Gossen MavoMaster support in LightingControl

Added support of Gossen MavoMaster lightmeters in LightingControl, on top of already supported Gossen MavoLux devices. Lightmeter selection, calibration, manual control and closed loop control behave the same way as for the Gossen MavoLux lightmeters.

2.2.7 Dark Signal Map support in FlareMeasure 

New “DarkSignalMap” input added to `dxomark.core.measure.FlareMeasure` and `dxomark.core.measure.FlareAggregation`. This input allows compensating black level per pixel of the flare subsampled image, instead of globally. Dark signal map can be computed with `dxomark.core.measure.FlareDarkMeasure`.

2.2.8 Support of a mask to reduce size of brightest patches for DR170dB setup

`dxomark.automotive.dynamicrange.P2020DynamicRangeMeasure` now supports the use of a mask to reduce the size of the brightest patches. A new input "`SetupType`" allows to select the type of setup:

- "DR170dB" for the default configuration (without mask)
- "DR170dB_with_mask" when using the mask.

Check the setup guide for more information.

2.3 Modified features

2.3.1 Noise score unreliability warning in DmcMeasure

`dxomark.core.measure.DmcMeasure` outputs a warning when the noise score may be unreliable due to excessive noise in the image.

2.3.2 New output "PercentageOfSaturatedPixels" in FlareMeasure

Now, `dxomark.core.measure.FlareMeasure` and `dxomark.core.measure.FlareAggregation` return the percentage of saturated in the output, with output key "`PercentageOfSaturatedPixels`"

2.3.3 MTF computed on luminance channel for RGB images

Now, `dxomark.core.measure.MTFMeasure` return results on a luminance channel. Luminance channel is computed as specified in ISO12233:2023 standard.

2.3.4 HDR Noise chart support in LCG measure

The LCG (Local Contrast Gain) measure now supports the HDR Noise chart.

2.4 Known limitations

2.4.1 ForceMarkerDetectionOnEveryFrame and wide angle distortion compensation on VisualVideoNoiseMeasure

ForceMarkerDetectionOnEveryFrame and wide angle distortion compensation are currently incompatible on VisualVideoNoiseMeasure. Setting ForceMarkerDetectionOnEveryFrame to True will disable wide angle distortion compensation.

2.4.2 Timing measure on tone mapped images

Timing measure can sometimes provide incorrect results on images tone mapped from HDR content

2.4.3 DXOMARK RAW not available

dxomark.protocol.raw is not available for this version of Analyzer. We recommend using Analyzer v9.1.1 for DXOMARK RAW.

2.5 Bug fixes

2.5.1 HDR related

#6153: ColorSpaceConverter.convertImage2sRGB was providing invalid pixel values for colors that were originally out of the sRGB gamut
#6236: No usable error was provided when trying to load a broken heic image
#6238: SetSdrDisplayLuminance was not working properly when applied on videoStreamHDR
#6240: SetSdrDisplayLuminance was not working properly in VideoColorStability and VideoColorFidelity measures
#6252: ColorSpaceConverter.convertXYZToRGBImage inline documentation was incorrect
#6258: when opening an HDR image, incorrect SDR diffuse white was assumed
#6318: jpg images with gain map were not seen as such consistently when using multiprocessing/threading to open the images
#6361: Android Ultra HDR 3-channels gain map was not correctly applied
#6362: Confusing error message was shown sometimes when opening a jpg image with gain map
#6380: Multi-channel gain map was applied on XYZ channels instead of linear RGB ones
#6460: Timing measure provided sometimes incorrect results on HDR input

2.5.2 Protocol Automation

#6210: Subsequences were not usable for protocol automation video when using MLS
#6230: Wrong device battery level was reported during protocol automation

2.5.3 Others

#6237: Online help was not available in python console for some measurements
#6241: Incorrect netmask of network interface was sometimes used when configuring MLS
#6346: Parsing ViewingConditions as Inputs in VisualVideoNoiseMeasure was returning an empty dictionary for Spatial Noise
#6357: A memory leak was corrected in SingleImageHDRMeasure
#6437: On high resolution images, DMC measure was sometimes returning wrong results for resolution estimation

3 - Analyzer 9.1.1

3.1 Bug fixes

3.1.1 Protocol Automation

#20110: fixed Protocol Automation that was not working unless HDR16 module was purchased

3.1.2 LabManager

#20160: fixed typo in functions to claim and release access to MLS in LabManager
#20160: fixed freeze when performing MLS calibration using LabManager in Protocol Automation
#20182: fixed several issues with MLS detection and serial connection using LabManager in Protocol Automation

3.2 Modified features

3.2.1 LabManager

Device network connection rework to make connection to device in same subnet on multiple Ethernet card more reliable.
(Affects mostly hexapod and MLS control)

4 - Analyzer 9.1.0

4.1 Breaking changes

4.1.1 MotionBlurMeasure and AutofocusHdrMeasure 

The `MotionBlurMeasure` has been updated to be consistent with other measures:

- The **`ImageCharacteristics`** input has been replaced by **`Img`** or **`ImgObj`**, similar to other measures.
- The **`ReferenceTemplateCharacteristics`** input has been removed, as well as the corresponding input in `AutofocusHdrMeasure`.
- The **`Roi`** input is now optional, with the default value automatically determined from the Dead Leaves marker positions.

4.1.2 VideoStream 

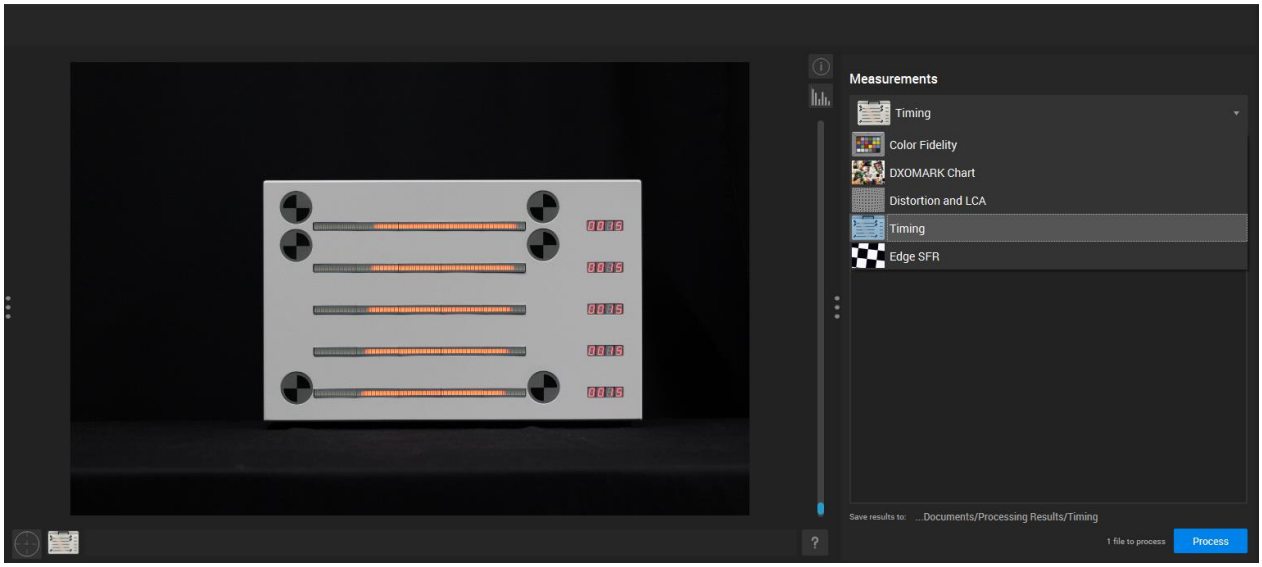
The deprecated VideoStream class was removed from Workflow Manager. In addition, “LEGACY” type value was also removed from VideoStreamType. You should use VideoStreamHDR and VideoStreamType.HDR instead.

4.2 New features

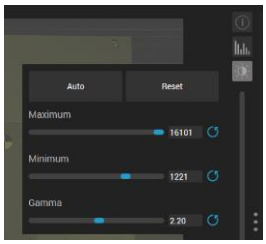
4.2.1 AZPhoto Application

The AZPhoto application now includes several new measures in the 9.1 release.

- Timing (dxomark.core.measure.TimingMeasure)
    - This measure requires images to be accompanied by a valid sidecar file on load. A valid sidecar file shall contain at minimum a 'TimeBoxCalibration' field correctly filled.
- Distortion and LCA (dxomark.core.measure.WideAngleDistortionMeasure)
- Edge SFR (dxomark.core.measure.MTFMeasure)



Additionally, the image viewer now contains a new feature for previewing RAW images. A contrast button, as seen in the right-hand image, will open, on hover, a widget allowing the user to change the contrast of the displayed image. It is important to note that this will not affect the processing of said image.



4.2.2 HDR metrics and measurements support

4.2.2.1 Local Contrast Gain measure

LocalContrastGainMeasure evaluates the local contrast preservation capability of an imaging system. The measurement uses a robust estimation of the local OOTF of the device to measure the gain between an infinitesimal contrast in the scene and its representation on the display. It is available both as a standalone measure in the Workflow Manager and as an additional output of several other measurements.

Please refer to the Analyzer User Manual and the WorkflowManager inline documentation for further details.

4.2.2.2 Motion Blur measure

The Motion Blur measure now supports HDR inputs. A new input `UseImageColorMetadata` makes the measure interpret colorimetry metadata in the input image, which makes the measurement more robust. This input is not turned on by default yet but will be in a future release.

4.2.2.3 Realistic Mannequin measure supports HDR image as input

The Realistic Mannequin measure supports HDR image as input now. The input HDR image will be converted to SDR image using a tone mapping before the measurement.
Two new input parameters enable to select the tone mapping and its corresponding additional options. These inputs are: `'ToneMappingType'` and `'ToneMappingOptions'`. Currently only tone mapping ITU BT2446-1 method A is supported. Please refer to the WorkflowManager inline documentation for more details.

4.2.2.4 DMC measure supports HDR image as input

The DMC measure supports HDR image as input now. The exposure and ruler measurements will be performed on the original HDR image. For the AI-based metrics (detail preservation and noise quality metrics), the input HDR image will be converted to SDR image using a tone mapping before the measurement.
Two new input parameters enable to select the tone mapping and its corresponding additional options. These inputs are: `'ToneMappingType'` and `'ToneMappingOptions'`. Currently only tone mapping ITU BT2446-1 method A is supported. Please refer to the WorkflowManager inline documentation for more details.

4.2.2.5 VideoDmcMeasure supports HDR Video as input

VideoDmcMeasure supports HDR video as input now. As for DMC measure, two new input parameters enable to select the tone mapping and its corresponding additional options.

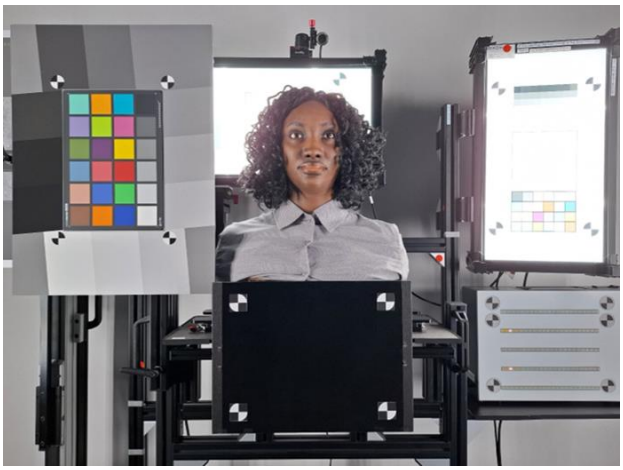
4.2.2.6 ISO 21496-1 gain map support

HEIC files following ISO 21496-1 encapsulation are supported partially. All images except those with alternate color space different than base color space or with more than 8bits gain maps are now supported.

4.2.3 New AutofocusRMMeasure 

The new AutofocusRMMeasure is introduced in Analyzer 9.1. This new class aims to measure the autofocus, where the timing is measured on the LED Universal Timer and the sharpness metric is measured on the realistic mannequin.
Please refer to the WorkflowManager inline documentation for further details.

4.2.4 New setup: AFHDR Portrait



4.2.4.1 AFHDR Portrait setup

We are introducing a new versatile setup. The purpose of this setup is to analyze the following camera device characteristics:

- The speed and the precision of the autofocus on a face and in different dynamic range and exposure conditions
- Exposure on face in HDR and SDR conditions
- Local contrast gain at different levels of the dynamic range of the image
- Face detail preservation
- Visual noise (on the greyscale chart surrounding the color checker chart)
- Flare (analysis of the impact of the flare source on the new flare chart)

4.2.4.2 AfhdrPortraitMeasure

This new measurement performs the AFHDR Portrait analysis using the AFHDR Portrait setup. The analysis includes the following measurements:

- Autofocus measurement on a realistic mannequin
- Timing measurements
- Exposure on face
- Local Contrast Gain measurement
- Face detail preservation measurement
- Visual Noise measurement

Please refer to the WorkflowManager inline documentation for additional details.

4.2.4.3 New Protocol Automation AfhdrPortrait

In addition to the new measurement AfhdrPortraitMeasure, a new protocol automation setup has been made available to automate shooting in predefined exposure, dynamic range, shaking conditions.
For the moment, only the automation of shooting part is available. The measurement and aggregation part will be released in the next version.

4.2.5 VideoTimingMeasure and VisualVideoNoiseMeasure supports markers positions for all frames as input

In TimingMeasure, `'CoordinatesMarks'` input can now be used to provide marker positions for selected frames.
In VisualVideoNoiseMeasure, `'MarkerPosition'` can now be used to provide marker positions for selected frames and `'PatchesPosition'` to provide patches position for selected frames.
Please refer to the WorkflowManager inline documentation for further details.

4.2.6 Add the possibility to modify the sdrDisplayLuminance value of the image playbackConditions

A new function setSdrDisplayLuminance is added in the corewrapperImage class. This new function enables us to modify the sdrDisplayLuminance of the playbackConditions of an SDR image. This action will modify the hdrHeadroom, peakDisplayLuminance and transferFunctionPeakLuminance values. Note: This method is not supported for HDR images.
Please refer to the WorkflowManager inline documentation for further details.

4.2.7 Add the possibility to set custom playbackConditions in VideoStreamHdr and modify the sdrDisplayLuminance of the custom playbackConditions

A new function SetPlaybackConditions is added in VideoStreamHDR class, this function enables us to set custom playbackCondtions, and it will apply to all frame of the video.
A second function SetSdrDisplayLuminance Is also added in VideoStreamHDR class. This action will modify the hdrHeadroom, peakDisplayLuminance and transferFunctionPeakLuminance values. User should first manually set a PlaybackConditions to the video stream, then use the function SetSdrDisplayLuminance(). Note: This method is not supported for HDR video.
Please refer to the WorkflowManager inline documentation for further details.

4.2.8 New VideoAutofocusHdrMeasure

The new VideoAutofocusHdrMeasure class performs the video analysis of the AFHDR (autofocus HDR) setup, based on texture, visual noise, motion blur, SingleImageHdr, local contrast gain and timing measurements.
Please refer to the WorkflowManager inline documentation for additional details.

4.2.9 Instrument control

4.2.9.1 DMX LED panels control in illuminance

Previously the LED panels (LitePanels Gemini and KinoFlo Celeb) could only be controlled in raw intensity value. With a new calibration in LabManager, user can now control the DMX panels using a target illuminance in cd/m².
Please refer to the LabManager inline documentation for more details.

4.2.9.2 Support of USB DMX adapter in LabManager

LabManager now supports all DMX adapters distributed by DXOMARK, connected either with Ethernet or with USB.
Please refer to the LabManager inline documentation for more details.

4.2.9.3 Full support in LabManagerUI

LabManagerUI now supports all instruments involved in protocols distributed by DXOMARK.

- Hexapod
  LabManagerUI now offers full support of the hexapod. Monitor motions available in LabManager, visualize motion, load and unload motion device controller and run motions directly from the web interface.
- AMO
- Digital Trigger
- DMX lights
  From LabManagerUI it is now possible to control LED panels (LitePanels Gemini or KinoFlo Celeb) in 8- and 16-bits modes. For advanced use you can also control individual DMX addresses in 8 bits.

4.3 Modified features

4.3.1 New MTF output 

MTF 20% has been added under the name “At20” and “At20-mm” to the output of the following measurements:

- MTFMeasure
- TextureMeasure
- CompositeHDRMeasure
- SingleImageHDRMeasure

Check measurements documentation for more information

4.3.2 New AutofocusMeasure input

A new input ImgObjList has been added for AutofocusMeasure. This input allows users to provide a list of already opened image objects to the measure.

4.3.3 New AutofocusHdrMeasure inputs

Three new inputs have been added for AutofocusHdrMeasure:

- ImgObjList: this input allows users to provide a list of already opened image objects to the measure.
- ApplyGainMapIfAvailable: this input is optional, with its default value set to False. When set to True, it will apply gain map to the list of input images if a gain map is available. If ImgObjList is the input and images are HDR, then the gain map has already applied to the images.
- GainMapApplicationOptions: this input is a dictionary which contains several different options when we apply gain map. For now, only PeakDisplayLuminance option is available.

Please refer to the WorkflowManager inline documentation for further details.

4.3.4 LabManagerUI

4.3.4.1 Save graphs

Users can now save illuminance and spectrum graphs directly from the web interface “Live” section, either as image or as raw data in a JSON format.

4.3.4.2 MLS calibrations

The organization of the MLS calibration in the web interface was reworked to better represent their interactions.

4.3.5 MLS calibrations

4.3.5.1 Ultra low-light control of the MLS

An optional dedicated calibration has been added to achieve better uniformity in LED 2700K 0.1lux. It can be launched either through perform_ultra_low_light_calibration method of dxomark.labmanager.interfaces.mlsinterface.MlsInterface or through the LabManagerUI.
Please refer to the LabManager inline documentation for more details.

4.3.5.2 Calibration report

The calibration report is a simple procedure to assess the system performance. It generates a JSON file with the measured spectrums at different conditions.
Please refer to the LabManager inline documentation for more details.

4.3.6 MLS closed-loop control stable

New ways were added to check if an ongoing closed-loop regulation is stable or not:

- First a new method **LabManagerClient.mls_interface.is_closed_loop_stable**.
- Second a new input to **LabManagerClient.mls_interface.set_illuminant**

- if **timeout** is set, then the function call will return when the closed loop has stabilized or when timeout is reached.

Please refer to the LabManager inline documentation for more details.

4.3.7 Simplified LabManager configuration

We removed some keys from the LabManager **config.json** file by scanning the computer for that information instead of relying on user interaction. Specifically:

- **amo.AmsNetID** and **amo.AmsPort** were removed. Now the user only needs to declare the AMO in TwinCat during the installation.
- **artnet.ip** was removed since LabManager scans the connected hardware for DMX adapters. Users can use a specific one or let LabManager use the default one (first Ethernet detected or first USB detected).
- **artnet.default_dmx_universe** was removed and 1 is now default in LabManager. Users can specify a custom universe in all function calls if needed.

Please refer to the LabManager inline documentation for more details.

4.3.8 RAW image support in WideAngleDistortionMeasure

WideAngleDistortionMeasure is now capable of measuring distortion and lateral chromatic aberration in RAW images up to 32-bit.

4.4 Known limitations

4.4.1 Incorrect ICC profile information in AZPhoto for HEIC/AVIF files

In AZPhoto, ICC profile information is always displayed as sRGB for HEIC/AVIF files whatever the real profile embedded. This only affects the displayed information in AZPhoto as the embedded ICC profile is correctly interpreted during the measurement phase.

4.4.2 Protocol Automation

4.4.2.1 Setup Video DMC, DMC Zoom and DMC Zoom Smoothness with MLS

The setups SetupVideoDmc, SetupVideoDmcZoom and SetupVideoDmcZoomSmoothness support the MLS but can only be run as full scenario. Subset is currently not supported with MLS on these setups

4.4.2.2 Folder creation on DMC Zoom and DMC Zoom Smoothness protocols

On these 2 protocols an issue prevents them to run correctly if the “distance” folder does not exist: **{protocol}\Photo\PV\DMC_ZOOM\{distance}**

The user must create this folder according to the used distance (either the **distance_to_chart** parameter, or the distance entered in the prompt)

The subfolders (**{Condition}\{Holder}**) will be created automatically when using ADB. Otherwise, they must also be created manually.

4.4.2.3 MLS calibration

If the MLS calibration is obsolete (MLS position has been changed for example) or missing, the protocol will not be executed correctly. As a workaround the user can manually run a MLS calibration before launching the protocol again.

4.5 Bug fixes

4.5.1 General

#5788: Too many unnecessary logs were present in stdout when using WorkflowManager
#5809: Fix a memory leak when using ViewingConditions
#5993: Using an image object with DmcMeasure was neither working nor documented
#6031: FaceExposureMeasure does not support HDR input
#6056: improve general robustness in Video measurements
#6065: Error map pixels are slightly misplaced in WideAngleDistorsion output
#6072: FOV map is computed on wrong positions in the case of a WideAngle camera
#6102: sidecar files for Color Sensitivity may not be correctly interpreted by WorkflowManager
#6108: NaN values in non radial max values of WideAngleDistorsionMeasure results
#6124: MeanRGB (in SingleColorMeasure) has wrong range if bitdepth is more than 8 bits
#6151: VisualVideoNoiseMeasure does not take correctly MarkerPosition as inputs
#6190: SingleImageHDRMeasure detects patches in wrong way for TOP_CHART

4.5.2 Documentation

#5953: VisualNoiseMeasure inline help is not well formatted
#6021: Add an explanation about how to give a color reference in Video ColorChecker protocol
#6024: Fix alphabetical order in WorkflowManager API html documentation
#6127: Add some needed clarifications on ColorSpaceConverter inline help
#6137: Fix some dead links in manuals

4.5.3 LabManager

#5909: When calibrating the MLS there was no error raised if the wrong unit was configured in Jeti spectrometer
#6003: Fix a crash in Server when no device was connected

4.5.4 AZVideo

#5982: Custom Viewing Conditions are deleted when re-opening settings tab
#6000: VideoDMCMeasure does not check result before trying to create the graphs when loading a previously saved report
#6002: Controls on VideoTexture measure are corrupted

4.5.5 AZPhoto

#5848: Histogram got issues when loading 10-bit or 12-bit or RAW images
#5999: DMC Measure only takes RBG images and will now fail gracefully if an incorrect image is provided.
#6012: Fix an unwanted graph resize when hovering ROIs in Color Fidelity report visualization.

5 - Analyzer 9.0.1

5.1 New features

5.1.1 MLS support in CameraV5 protocols

Since Analyzer V9.0 release MLS devices are supported in some protocols. The following protocols are concerned:

- Photo
    - AFHDR
    - DMC
    - DMC Zoom
- Video
    - DMC
    - DMC Zoom
    - DMC Zoom Smoothness

5.1.1.1 Automatic detection

The scripts that run these protocols should automatically select your current lighting system based on heuristic, but sometimes this mechanism fails to behave correctly.
In this case, it is possible to force lightings system to use in a protocol you can add an optional setting to run the protocol.
This setting is called “use_mls”, and takes a Boolean (“True”, or “False”) value, and is passed to run() method through “options” parameter (see concerned protocols documentation for further details).

5.1.1.2 Scripts update

In order for automatic lighting system to work (in all protocols), Python scripts need to follow more closely Python correct development requirements. This translates in your scripts by having the code in a code block defined by “*If __name__ == “__main__”:*” statement.
You can see examples in the documentation of all concerned protocols.
Do not hesitate to contact the support (support.analyzer@dxomark.com) in case you have issues with this change.

5.2 Bug fixes

5.2.1 Protocol Automation

#6069: Fix aggregated outputs for Zoom protocols in Protocol Automation
#6018: waitTime argument was not taken into account for AFHDR automation

5.2.2 AZPhoto

#6033: User was unable to load any images without HDR16 license bit

6 - Analyzer 9.0.0

6.1 Breaking changes

6.1.1 FlareMeasure 

The IEEE-P2020 standard committee has decided to replace the “flare attenuation” metric with “flare intensity”. The flare measurement now includes flare intensity output keys. See the API documentation, and Flare user manual for more information.

Some output keys have also been **removed** from `FlareMeasure`:

- `IlluminanceMap`
- `MaximalIlluminance`
- `MeanIlluminance`
- `FlareAttenuationMap`
- `LargestMeasurableFlareAttenuationdB`
- `SmallestMeasurableFlareAttenuationdB`

`FlareMeasure.SaveAll()` and `FlareSensitivity.SaveAll()` functions have been renamed to `SaveResults()` in order to be more consistent with other measures, and the `"customName"` parameter has been removed.

The `"MinimalFlareAttenuationIndB"` output is now computed as minimal flare attenuation on the whole flare map, instead of percentile 1% in the previous version. Values may differ. Similarly, `"MaxFlareIntensityIndB"` is computed as maximum flare intensity on the whole flare map.

6.1.2 MtfCollimatorMeasure 

The input `"UserSpecifiedROIs"` of `MtfCollimatorMeasure` is renamed to `"PatchesPosition"` in order to be more consistent with other measures. Additionally, its structure has changed. For a complete description about its structure, see the inline help of `MtfCollimatorMeasure.Inputs`.

The output `"ROI"` is renamed to `"PatchesPosition"`, and now uses the same format as the input.

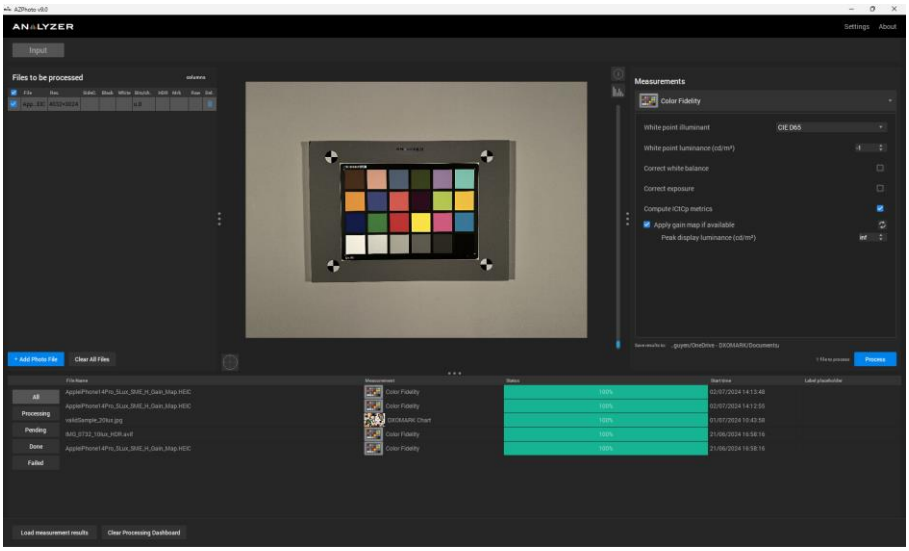
6.1.3 P2020NoiseMeasure 

The optional input key `"ForceSaturationToMaxSignal"` has been replaced by `"SaturationLevel"` in P2020 Noise measurement. This new input allows users to define a custom saturation level for the test images, it is particularly useful for the computation of saturation related metrics in the case that cameras have non constant saturation.

6.2 New features

6.2.1 New AZ Photo application

AZ Photo is the new graphical user interface dedicated to photo measurements.



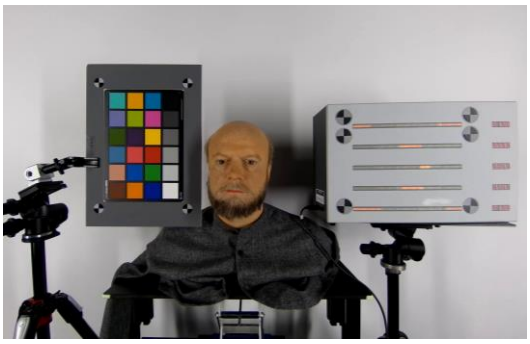
This new interface provides easy to use reports for the following photo measurements in Analyzer 9.0, with more to come in future releases:

- Color Fidelity, with HDR support (**`dxomark.core.measure.ColorMeasure`**)
- DXOMARK chart (**`dxomark.core.measure.DmcMeasure`**)

Note that the legacy graphical interface (“Analyzer”) is still available for the transition period; it is however considered deprecated and will be removed once all measurements are available in AZ Photo and AZ Video. It will also provide no access to new inputs, outputs or features that have been added recently (such as HDR support).

6.2.2 Single Person Video Conference Measure (SPVC)

This new measure is available in Workflow Manager, and is designed to perform video analysis of the following setup using one of the available realistic mannequins:

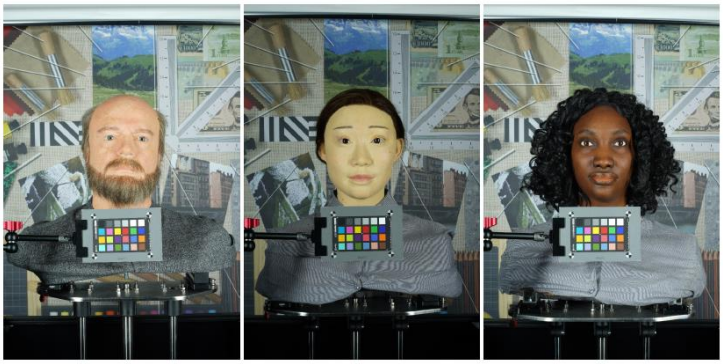


See **`dxomark.core.videomeasure.SinglePersonVideoConfMeasure`** for more information about this measure. In particular, the following outputs are available:

- Face exposure
- Face detail preservation
- Video Timing
- Video Color fidelity
- Video Exposure convergence
- Video Color stability

6.2.3 New model for Realistic Mannequin measure

The Realistic Mannequin (RM) Detail Preservation Metric is a learning-based method that assesses the level of perceived texture on a face in a controlled portrait setup environment. This measure is available in Workflow Manager in **`dxomark.core.measure.RealisticMannequinMeasure`**.



A new trained model has been added, with the following improvements from the previous model:

- Support for the dark skin tone realistic mannequin “Diana”.
- Wider coverage in image quality levels, with a much greater range of very low quality and very high quality devices in the annotated training set.
- New output for aligned quality metrics, allowing comparisons between all realistic mannequin models (“Eugene”, “Sienna” and “Diana”).

Users can manually select the model by setting the input key `"RealisticMannequinVersion"` to one of the options below.

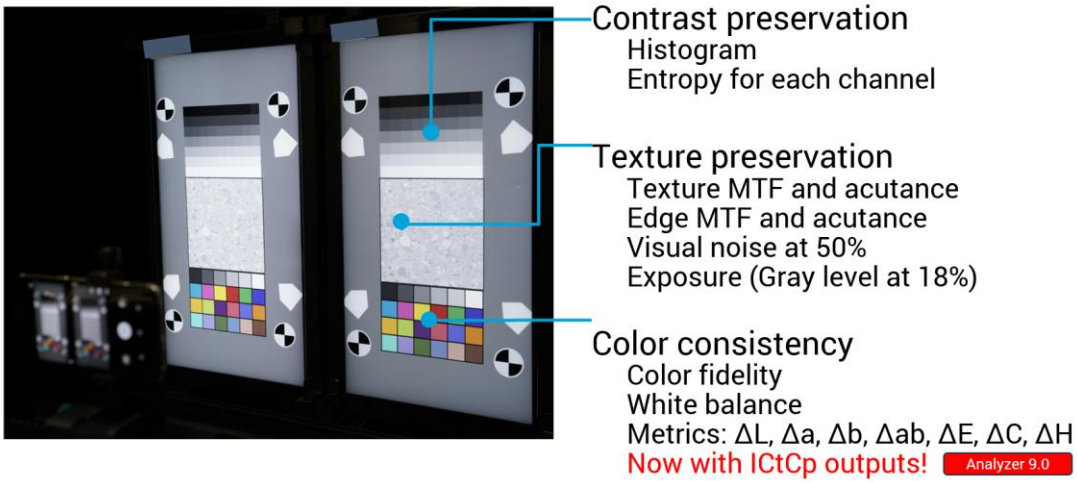
- `RealisticMannequinModelVersion.RM_V1`:
  Previous model supporting Eugene and Sienna, default value.
- `RealisticMannequinModelVersion.RM_V2`:
  New model supporting Eugene, Sienna and Diana.

The selected version of the mannequin will appear in the output dictionary as `"RM_V1"` or `"RM_V2"`.

The Analyzer manual and Workflow Manager API documentation have been updated to provide detailed information about the new model.

6.2.4 Composite HDR measure

The “HDR Composite” measure performs comparison between two images (reference and tested sample) of two composite charts (left and right) placed side by side, in terms of color differences, sharpness, contrast and noise.



Previously only available in the legacy “Analyzer” interface, this measure is now available in the Workflow Manager API at `dxomark.core.measure.CompositeHDRMeasure`.

This new API also provides access to color difference metrics compatible for HDR-encoded images in the ICtCp color space.

The Analyzer manual and Workflow Manager API documentation have been updated to provide detailed information about the use of this measure.

6.2.5 Flare

6.2.5.1 Flare Intensity

Flare Intensity metrics as defined in IEEE P2020 draft have been added to the flare measure outputs. See the flare user manual and API documentation for more information.

6.2.5.2 NIR Flare measure

So far, the flare measure quantifies the performance of a device in terms of flare using a visible light source. The measure has been extended to measure stray lights using near infrared (NIR) light sources. It is done using the class **`dxomark.core.measure.FlareMeasure`**.

6.2.5.3 Flare Aggregation

Flare aggregation (aggregation of the flare measurement for all angles of a camera) is now available using the class **`dxomark.core.measure.FlareAggregation`**. See the API documentation for more information.

6.2.5.4 New inputs and outputs in FlareMeasure and FlareAggregation

The **`FlareMeasure`** and **`FlareAggregation`** measurements have new inputs and outputs.

A new output has been added under the key **`"CdfFlareIntensityIndB"`**, giving the cumulative distribution function of flare intensity in dB.

A new input has been added under the key **`"FlareIntensityThresholdIndB"`**. When provided, a percentage of the image that is above this value will be output under the key **`"PercentageOfImageWithFlare"`**.

6.2.6 HDR formats and color management support

Analyzer 9.0 has a lot of improvements related to HDR support!

6.2.6.1 Support for Apple iOS 18 HEIC gain map image format

Support for HEIC gain map images generated by Apple devices using iOS 18 (following standard draft ISO/CD 21496-1) is added.

This joins the existing support for Apple (pre-iOS 18) and UltraHDR (Android) still image formats that incorporate gain maps. Gain maps allow these devices to store both HDR and SDR renderings in the same file while retaining backwards compatibility with SDR displays.

6.2.6.2 Considering the peak display luminance when computing HDR gain maps

It is now possible to provide the target peak display luminance as input when HDR gain maps are applied. For example, this allows measurements as if the image was seen on a 1000 nits display, even if the fully-applied gain map image can go up up to 1800 nits.

In the case of UltraHDR images, the computation is performed according to the corresponding specification since such a possibility was described there. As for Apple images, the provided luminance is used for computing the headroom and the latter overrides the one specified in the MakerNote values described in the Apple documentation, and looks visually identical to the rendering of the Apple Photos software.

6.2.6.3 Processing 3-channel UltraHDR gain maps, with gamma not equal to 1.0

The single-channel limitation in UltraHDR gain maps has been removed. Also, if gamma is not equal to 1.0, such images are accepted, and the corresponding correction is applied. Such images can be generated by some third-party software like Adobe Photoshop.

6.2.6.4 Improved color space conversion tools

The class **`dxomark.corewrappers.ColorSpaceConverter`** is now the recommended way to perform color conversion between different color spaces (such as: Nonlinear RGB, Linear RGB, CIE-XYZ, CIE-L*a*b* and IC_TC_P). This new colorspace converter supports images loaded using **`dxomark.corewrappers.Image`** ; image value ranges and memory allocation are now managed automatically.

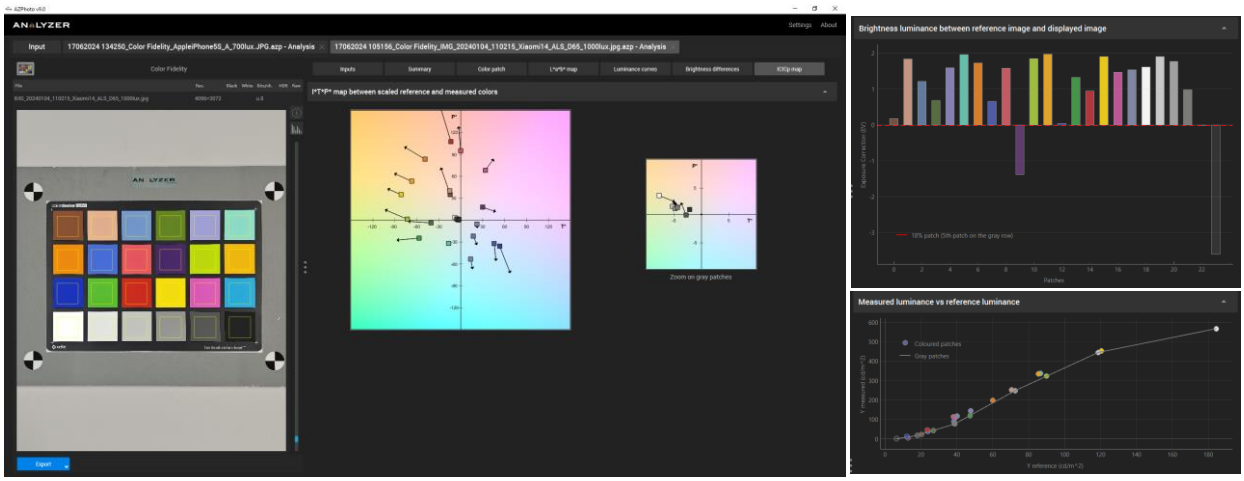
The conversion tools previously available in **`dxomark.core.measure.ColorSpaceConverter`** are fully replaced by this new class and are considered deprecated.

6.2.7 HDR metrics and measurement support

Analyzer 9.0 continues the work on supporting HDR-encoded formats in all measurements and analysis tools.

6.2.7.1 Color Fidelity reports for HDR-encoded images in AZ Photo

AZ Photo supports Color Fidelity reports for HDR images encoded using either one of the supported ISO 22028-5 compatible HDR formats (using ITU-T H.273 CICP metadata with the HLG or PQ transfer functions, such as AVIF/HEIF/PNG), or one of the supported gain map formats.



The generated reports provide visualizations of IC_TC_P and CIE-XYZ metrics, allowing the user to analyze and compare different HDR formats, or even between HDR and SDR formats.

6.2.7.2 ICtCp output available in more measures

Several measures that output CIE-L*a*b* related metrics have been modified to also output IC_TC_P related metrics when using input setting **`'ComputeHdrMetrics'`** as True.

The concerned measures are:

- AutofocusHDRMeasure
- ColorMeasure
- CompositeHDRMeasure
- DmcMeasure
- FaceExposureMeasure
- PortraitHDRMeasure
- PortraitTimingColorMeasure
- PortraitTimingColorSelfieMeasure
- SingleColorMeasure
- SingleImageHdrMeasure
- TextureMeasure
- VideoColorFidelityMeasure
- VideoColorStabilityMeasure
- VideoDmcMeasure
- VideoExposureConvergenceMeasure
- VideoTextureMeasure

6.2.7.3 DeltaCSITP and NESITP outputs for IC_TC_P computation

Several additional outputs, including ΔC_{SITP} and NE_{SITP}, are now available when computing IC_TC_P metrics (input setting **`'ComputeHdrMetrics'`** as True in supported measurements).

These metrics take into account the linear “exposure” correction of reference IC_TC_P value respect to the measured luminance value. More details are available in the Color Fidelity part of the User Manual.

6.2.7.4 New convergence thresholds for Video Exposure Convergence measure

In the Video Exposure Convergence Measure, IC_TC_P exposure convergence metrics are computed with adapted thresholds and not with the L*a*b* thresholds.

6.2.7.5 sRGB linearization in Photo and Video Vignetting measures

A new optional input **`"UseImageColorMetadata"`** has been added to **`VignettingMeasure`** and **`VideoVignettingMeasure`** in Workflow Manager.

This inputs directs the measure to perform sRGB linearization before performing the measurement, allowing comparison of results generated from files with different color encodings (e.g. one SDR image and one HDR image). By default, it is set to False.

6.2.8 Additional instrument control in LabManager

6.2.8.1 Hexapod interface

It is now possible to control a PI Hexapod (H-811, H-840 and H-860 models) using the Hexapod interface Python API in LabManager.

Features directly overlap everything that the Shaker software can already do, which includes:

- Adding, removing, listing wave motions (move motions are no longer supported as they are deprecated in the PI control API)
- Running / stopping / progress of loaded motions
- Moving to a given position
- Moving to neutral / shipping / rest predetermined positions
- Setting and getting the pivot point position

6.2.8.2 LED Universal Timer interface

It is now possible to control a LED Universal Timer mark I/II using the Ledbox interface Python API in LabManager.

Features directly overlap everything that the Timer Pilot software can already do, which includes:

- Setting a configuration in timing or flickering modes
- Retrieving a set configuration

- Setting led line period, intensity, duty cycle, phase values independently
- Setting 7-segment display intensity (not independent) and values
- Starting and stopping the monitoring of autofocus captures when used together with a Digital Trigger in autofocus triggering mode, a Digital Probe and an AMO

6.2.8.3 Digital Trigger interface

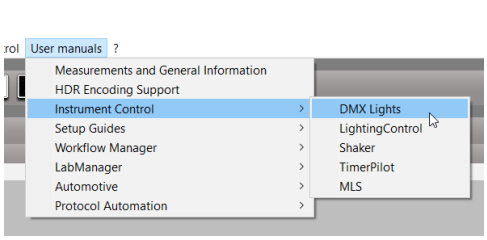
It is now possible to control a Digital Trigger using the Digital Trigger interface Python API in LabManager.

Features directly overlap everything that the Timer Pilot software can already do, which includes:

- Triggering a single shot on a device under test
- Starting and stopping the autofocus triggering mode

6.2.9 LitePanels Gemini user manual

A new user manual has been written for the LitePanels Gemini fixtures. It has been merged with the already existing Kino Flo user manual under the name DMX Lights, aggregating all resources about DMX light fixtures.



This user manual is available through the Analyzer GUI under the “User manuals” > “Instrument Control” > “DMX Lights” menu.

6.2.10 Jeti Specbos 2501 spectrophotometer support

On top of the Jeti spectraval 1501 and 1511 spectrophotometers, LabManager now officially supports the Jeti Specbos 2501 through the ***`spectrophotometers_interface`***. The same commands are all available for this new device, that features the same technical specifications as the Jeti Spectraval 1511 spectrophotometer.

WARNING: the serial number used to control a spectrophotometer through the ***spectrophotometers_interface*** has changed to match the serial number printed on the side of the device.

6.3 Modified features

6.3.1 Linearity calibration of the MLS speed up

The linearity calibration can now be performed in 3 hours 20 minutes using the JETI spectrophotometer (20 minutes using the CSS45 spectrophotometer) instead of 17 hours.

6.3.2 P2020DynamicRangeMeasure

A new optional input **"SaturationLevel"** has been added to P2020 Dynamic Range measurement. This input allows users to define a custom saturation level for the test images, it is particularly useful for the computation of dynamic range metrics in the case that cameras have non constant saturation.

6.4 Known limitations

6.4.1 White point value in ICtCp and ComputeHdrMetrics

The **"WhitePoint"** input has a different interpretation for ICtCp metrics than it has for CIELAB-based metrics. While the results are technically correct, they might be of difficult interpretation because of several color adaptations that occur.

When using the **"ComputeHdrMetrics"** option in any of the measures, it is recommended that the input **"WhitePoint"** is left to its default value (D65). Furthermore, when interested in chromatic differences in ICtCp it is recommended that the references be provided directly using this color space.

6.4.2 Measurement ROIs sometimes incorrectly positioned in AZ Video preview

In AZ Video, when viewing results of measurements performed using previous version of AZ Video (8.0 to 8.4), measurement ROI positions will be incorrectly displayed in the video preview if the videos have a rotation tag. The measurement results are still correct, only the display is affected. To have proper ROI positions in the display preview, measurements have to be launched again using AZ Video 9.0.

6.4.3 Viewing Conditions in AZ Photo and AZ Video

In AZ Photo and AZ Video, custom Viewing Conditions are lost if the user goes back to settings panel after validating them. They can still be used in the measurement if the user does not go back into settings panel after adding them.

6.5 Bug fixes

6.5.1 General

#4047: Improve the maker detection in some corner cases
#5444: fix the CSF normalization factor in acutance when another CSF is used
#5453: fix a random crash in ViewingConditions when image object is loaded in input dict
#5535: improve the installation of a new version when a WorkflowManager virtual env is still running
#5542: fix the low quality of few pictures in the 3D geometry chapter of main Analyzer manual
#5547: fix the computation of the MTF curve in FocusRangeMeasure
#5583: fix the display of numerous logs about ImageAutoOrientation errors
#5730: fix a crash in MtfComputeLsfTransition
#5753: fix a bad memory management in VideoVignetting leading to high memory usage
#5766: improve the removal of outliers in WideAngle LCA measurement
#5771: fix the management of CFA files saved with NumpyImage in LCA measurement
#5810: fix a memory leak in some processings
#5921: fix a misleading documentation for TCGamma22 input in MTFMeasure
#5954: fix the inline help of AFHDR measurements

6.5.2 AZVideo

#5289: fix a case where the tooltip was staying on screen
#5290: fix the synchronization of the timeline and the video preview and chart
#5354: fix the wrong orientation of the overlay over videos with orientation tag
#5400: fix time pointers stuck on the left
#5402: fix a warning when loading measurement report
#5417: fix drop list stuck on wrong value for Visual Video Noise measurement
#5433: fix the preview frame still visible after having removed the video from the list
#5434: fix a random crash when launching a processing
#5462: improve the display of elapsed time
#5568: improve the smoothness of video preview
#5574: improve the management of trying to open a removed video
#5943: fix a crash when launching AZVideo while an instance is already running

6.5.3 LabManager

#5706: fix the issue to have to rerun the spectrum calibration when adding a preset for MLS

#5707: fix the launch of linearity calibration when spectrometer measurements are displayed in the UI
#5857: clarify the naming restrictions for MLS custom presets
#5919: fix the calibration steps about NIR

6.5.4 Collimator

#5715: clarify the Compass procedure to go back to storage position when using the collimator
#5725: fix wrong ROI detection with collimator in presence of hot pixels
#5726: fix the management of UserSpecifiedROIs input when using Collimator measurement

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