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Andor iQ 1.10.0

October 30th 2009

Introduction

iQ 1.10.0 marks a major step towards the release of iQ 2 and brings together some key features and enhancements which brings many new benefits and requested features to the software. In this release we prepare for iQ 2 functionality by enhancing many facets of iQ's operation and flexibility, enabling dual camera simultaneous acquisition in a single PC, extending the application of FastLZ module, dramatically improving Scan flexibility and changing the way that Protocols are constructed and executed.

All this helps to pave the way for more flexible Protocols in iQ2 and provides a means of monitoring Protocol execution progress in the Python programming environment. Exchange of data between Python's Numpy arrays, iQ ImageDisk and the HDF5 open file format will allow users to code iQ-Python extensions for image processing and real time control. But for those Python capabilities we must wait for iQ2, which is now scheduled for release in March 2010.

New Features in this release

Protocol Tree changes –

We have removed the Protocol Wizard from iQ 1.10.0 since it was a source of some unnecessary limitations and could lead to erroneous labelling of Channels in a Protocol. Now the User Creates a basic single channel Protocol with the **Protocol Manager New** button.

Time lapse protocols allow channels and scans can be inserted at the desired locations in the Protocol Tree, while **FLZ** protocols now **accept XY Scans** by insertion, with channel and Z scan control managed from the FLZ Sequence tab. If the user wants to make a multi-channel Protocol, then at least two channels must exist or be created as usual with the Channel Wizard and then inserted into the Tree.

All operations on the **Tree** are now handled from the right mouse **pop-up menu**, enabling **Insert and Delete**. Scans can be inserted in the same way. In future, this same mechanism will be used to Create Protocols of much higher complexity and flexibility to address user needs.

We also added the new Protocol key word **Wait for Allocation ON/OFF** – which allows the user to specify whether to wait for iQ to finish allocating on the ImageDisk before starting the protocol (ON) or to start while allocation proceeds (OFF). This required the threading of the ImageDisk control and is helpful to avoid a long delay before starting with large data sets e.g. overnight runs. Although this has an impact on performance until allocation is complete, the convenience outweighs this when speed is not of the utmost importance. Also note that **Load Protocol** now can be issued and the Protocol execution started much more quickly with this setting off.

The “Current” Channel – guards against inadvertent channel edits

iQ now defaults to using the **“Current” channel** in the base Protocol, which uses whatever **current settings** are shown in the **Device Setup** dialog. This means the user can acquire data without first defining a Channel, simply by setting up the required values in the Device Setup tabs. The other benefits of the “Current” Channel include isolation of user-defined channels from inadvertent changes. At the end of Protocol execution iQ switches the Device

Setup to “Current” and any changes in the GUI cannot be applied to another channel without its explicit selection.

FLZ fixes and enhancements

The **FLZ** module has been improved to allow operation with various hardware devices, where it was previously restricted.

- New **Protocol control** of **FLZ** – when a Protocol is defined as FLZ, iQ creates an FLZ settings file of the same name and stores the current **FLZ** parameters into it. When the Protocol is executed iQ initializes FLZ to those settings. This can be updated by the **Save** option in FLZ so the user can invoke execution of given set of wavelength, exposure and Z scan ranges without the need to reprogram the FLZ Sequence GUI.
- **FLZ** can now be used to capture **LZ bursts at multiple-XY fields**, whether in multi-well plates or multi-point sequences. This feature has been frequently requested and now finds its way into the feature list.
- **Burst** capability extends the **Timing** control tab to support more flexible programming of synchronized changes in TTL output signals e.g. for perfusion control or laser shutters. Burst acts as an inner control loop and the Protocol Repeat as the outer, allowing us to generate repeating control sequences in which 3 Burst TTL signal can be triggered on and off at arbitrary points in the Burst. The outer Protocol Repeat defines how many times the sequence will occur. This can be considered as a “**Ring**” **operation** used for sequential laser wavelength exposures each with a user-defined period and the sum of exposures being equal to the Burst value.
- Acquisition of **bright field (e.g. DIC)** images at user defined Z position has been extended to function with 200, 250 and 500 um Piezo device ranges as well as 100 um.
- We have improved the synchronization issues with using **Frame Transfer (FT)** in FLZ. FT was removed to avoid the risk of bright or over-exposed frames in the FLZ sequence, resulting from Windows software latencies which can delay External Trigger signals being sent to the camera. This feature has been made more robust and is available to meet user speed requirements. Better FLZ execution sequencing and faster multi-core processors have contributed to reduce the risk of such errors.
- **FRAPPA** can now be operated with FLZ and also specify a Z plane for FRAPPA action known as the “Resting Z position”. This change makes it possible to implement fast LZ scanning alongside targeted 3D FRAPPA on user-selected regions.

Simultaneous high performance two camera acquisition can now be done on a **single PC** using two instances of iQ 1.10.0. One instance is run as **FLZ Master**, while the second is run as **Fast Slave**. Both cameras must be set to External Trigger mode in their respective instances of iQ 1.10.0. The Master is setup to Run a single wavelength FLZ protocol (N repeats, Z z-steps), while the second is setup to Run a single channel Fast protocol with M frames, (with $M = N \times C \times Z$). The Master camera is triggered from PCU output D07, as normal and the Slave is triggered from the Master Fire pulse. The images can be merged into 2 channel, ZT series using the Dual ImageDisk Plugin as documented in the new iQ 1.10.0 user guide. In this way our tests on a dual core mid range Dell PC we have achieved performance which approaches (98%) of single camera execution running at full speed. For best performance we recommend use of a dedicated dual disk RAID 0 configuration for the iQ ImageDisk.

Major Improvements to Scan Capabilities and User Control of Scanning

- Rationalization of Scan setups now allows the creation of multi-well patterns, called **Plates**. When a Plate is used for a new scan sequence, the user defines the **Origin** of the first well (top left coordinates). If the orientation of the well plate is not parallel to the stage axes for any reason, then the “**Skew**” can be compensated by specifying a second coordinate pair of another well on the same row as the first e.g. second or

last in that same row. The skew will be used in computing the correct XY coordinate sequences to ensure accurate scanning of the Wells.

- The multi-well scan can be further modified in the definition phase, with a **user-specified list of Wells to be Included or Rejection** from the scan. This can be because the Wells were not used or because the specimen did not behave as required e.g. the cell colony died or did not transfect. The **Rejection list** is specified in a simple user interface step and specified by sequences like this - "9, 10, 11, 15-18, 21-24".
- The multi-well scan can now be setup to include an **Autofocus** offset (ZDC or PFS value) for **every well or field** in each well.
- Systematic sampling can be applied at all wells as previously possible.
- In Multi-field or Multi-point imaging the user can also add an Autofocus value on a per field basis.
- **Montage** is also extended to include **Autofocus** settings on a per field basis.
- In all **Multi-well and Multi-field** cases **Montage** can be specified at each field position, with the position taken as the montage centre.
- To implement Montage scanning at each field we have introduced the Montage dimension into the image to allow ease of Navigation?
- When a scan is being defined, edited or executed in a Protocol iQ now creates a **graphical view of the scan pattern** (including wells and montages if present) and shows the user where the stage/camera is currently, in relation to the pattern defined. This is a most helpful addition to interpreting/monitoring progress.
- The **Z Registration** step of Stage Registration, at iQ startup has been removed. Now the user just needs to "**Focus the First Field**" of a scan before running a Protocol which includes an XY or XYZ scan.

Clara – Andor’s latest high performance CCD camera,

Clara utilizes the Sony ICX285 sensor and offers **1362x1040 pixels with 6.45 um square pixels**, matching the Nyquist sampling criterion with high resolution 60X and 100X objectives. The camera benefits from our new Volvac technology, vacuum sealing the chip for unrivalled fan-assisted cooling to **-45C**, and long term sensor environmental stability. Without fan cooling, a must for **electrophysiology** and other **vibration sensitive** applications, the camera can maintain a stable sensor temperature of **-20C**.

Clara is interfaced to Windows PCs with the industry standard USB 2.0 (480 Mbps) and uniquely offers three read out speeds to allow trade off between frame rate and read noise, with figures respectively of 1 MHz @ 3 electrons rms (e), 16 bit resolution; 10 MHz @ 4.5 e, 14 bits; and 20 MHz @ 5.5 e, 14 bits. The exceptionally low read noise of 3 e at 1 MHz delivers industry-leading dynamic range of 7000:1 and makes full use of the ADC bit depth. Clara provides flexibility, compact design, unrivalled cooling and is the top performing CCD camera in the microscopy market. **iQ 1.10.0** provides full control of all Clara features, including "deep depletion mode" which extends its red performance beyond 800nm. **iQ 1.10.0** supports Clara in both Time lapse and FLZ modes.

ImageDisk – in order to achieve the **simultaneous acquisition from two cameras**, we have improved management of memory and the **shared ImageDisk**. Image writing functions have been **threaded** to allow each instance of the software to operate without blocking the other. We have also **threaded the image** and time stamp **allocation** processes to virtually **remove the start delay** when running a Protocol with a **large number of frames**. This also substantially **removes transition delays** when using **Load Protocol** to build more complex Protocol sequences.

ImageList - we have changed the presentation of metadata in the image details section to reflect the protocol tree rather than an internal array structure. This makes the information much more readable and easily interpreted. In addition, the presentation of image name and path has been cleaned up to improve the user interface and ease the finding of images in the list.

Andor SIF file– Andor’s **SIF** files are generated by **Solis** when streaming mode kinetic series to disk. Since **Solis** can run all Andor cameras at the full potential frame rate, including "**virtual chip**" mode at

thousands of frames per second, it is the most efficient way to acquire when raw speed is the primary goal. From version iQ 1.10.0 onwards we can guarantee compatibility with **Solis** SIF files via shared libraries, thus ensuring smooth translation between the two programs.

Field Split Plugin – now allows for Rotation with split field images as well as dual camera images.

Filter Plugin provides a set of 3x3 convolution based filters and has been fixed to correctly handle RGB image types such as AVI and BMP. This plug-in also provides 3 neighbourhood ranking filters, Median, Erode (min) and Dilate (max).

Format Converter (Image Edit menu) now supports RGB split, which creates a 3 channel 8 bit image from the 24 bit type, assigning Red, Green and Blue pseudo color look up tables to the appropriate channel.

Montage Plugin has been enhanced to support the Multi-field or Multi-well Montage case outlined in Scan improvements above.

FRAPPA – performance has been improved by threading the computation and execution to reduce blocking the rest of iQ.

Olympus ZDC – we have improved the ZDC user interface and reporting to provide better feedback and advice to users. During operation the ZDC dialog shows “amber” and when it completes successfully the dialog shows “green”. On the other hand if the process fails then the dialog shows “red”, indicating it was unable to “find” the air-glass or glass-medium interface. ZDC supports a subset of the Olympus objective range, so if ZDC fails because the objective is not supported, then iQ shows a suitable text message to this effect. The result is a more informative and friendlier operation.

Ludl MACX000 controller - we have worked with Ludl over the last few months to implement control of their new MAC6000 controller into our Ludl control adapter. In addition, we have added user interface components to allow selection of Closed or Open Loop operation and setting of Stage Axis Speed and Acceleration profiles. In this process, a long standing communications timeout bug was discovered, which has now been fixed and results in faster filter wheel movements.

Bug Fixes

- Reading of a series of **single TIFF files** could result in frame time or Z stamps having the same value throughout the series. This has now been fixed.
- **Dimension Editor** in the Image Window Edit menu has been enhanced to allow editing of Channel names and values. In previous versions of iQ this bug could arise and then images would not be accessible to processing because of duplicate channel stamps. This can now be rectified, and is no longer possible in iQ 1.10.0 since the Protocol Wizard has been removed.
- **Selector** could mangle LUTs and channels names or values. This bug has been fixed.
- **Dual ImageDisk Plugin** has been repaired to avoid mangling channel names, LUTs and values.
- The **interactive Mapping** dialog could result in an exception on the exit from iQ if left open. This bug has been resolved.
- The **Max Timeout** setting is intended to define the duration of countdown dialogs which give the user an opportunity to switch software action e.g. “Redefine Scan Range”. The setting failed to function correctly, but has now been resolved.
- **Maximum Exposure** of Andor cameras has been set to 120 minutes, whereas it was previously 60 minutes.
- **Channel DeltaZ** allows each channel to be offset relative to others in a Protocol, correcting for chromatic aberration or adjusting to the plane of features of interest. This feature was bugged and now is fully functional and performs with Z scans also.

- **FRAPPA Channel DeltaZ** has been added to allow for FRAP and PA actions at a preferred Z plane in Time Lapse mode.
- **FRAPPA Events** and ROI coordinates were jumbled in the Image Header. This has been fixed.
- **Unable to Communicate with Card error** has been fixed and was due to a timeout value not being updated when exposure time exceeded 600 ms.

Last, but not least our friends at **Bitplane** have implemented improved the speed and interpretation of the Andor **Multidimensional TIFF** files in **Imaris 6.4**, which releases at the end of October. As an example a large 5D data set which previously took 13 minutes to load has been bench marked at 2.5 minutes by a user at MPI in Dresden.

We sincerely hope that the substantial improvements reported here will make the lives of our users more satisfying and productive. Please keep advising us of things you would like to see and frustrations or problems you face so that we can continue to improve the product.

Warm Greetings from

The iQ Development Team in Belfast and North Carolina.

- **Andor iQ 1.9.1**

April 23rd 2009

Introduction

iQ 1.9.1 is an intermediate release, provided as an interim before iQ 2 is released later this year. The main issues addressed are new device controllers, bug fixes and some improvements to scanning multi-well or micro plates.

New features in iQ 1.9.1

Andor **ALC-UVP-350** is a new controller for a 350 nm, 60 uJ, 5ns pulsed UV laser device. This unit can be used for ablation or cutting and when power is reduced for uncaging and spot photolysis. For more information on the UVP instrument follow this link.

http://www.andor.com/microscopy_systems/peripherals/laser_combiners/?docID=896

The **Stage Alignment Wizard**, required for Multi-well and Montage scan operations, developed a bug in the last release and has now been fixed. This enables alignment of the camera X and Y axes to be parallel to the motorised stage motion.

Multi-well or Micro Plate Scanning - we have fixed a scan orientation problem when working with back illuminated cameras, which resulted in well scanning starting at the bottom left well instead of the top left. Now well scanning performs as expected - always from well #1 in the top left of the stage and the well.

The **CoolLED precisExcite LED** light source controller has been improved and we can now offer direct TTL control as well as USB to enable high performance switching. In addition we have removed the need for the installation of the CoolLED supporting software (~100MB) so only the iQ installation is required. Overall speed of acquisition has been improved by a factor of 2.

Recent changes to **Sutter 10-3** filter wheel controller firmware had caused an error in communication with iQ. We have now updated the Andor iQ adapter to fix the problem.

Andor laser combiner, **ALC-401** controller has been improved to return actual power from Cobolt lasers. The previous versions returned only the set power value. This is useful for monitoring performance. In addition we have now ensured that all analog settings for unused laser lines are set to zero to minimise any potential AOTF cross-talk.

Andor iQ 1.9 and iQ2-Py

October 13th 2008

Introduction and highlights

iQ 1.9 is intended to be our last release before iQ 2.0 which is planned for beta in late October. Version 2.0 has been in planning for some considerable time and we hope it will resolve many outstanding issues with iQ 1.X. In particular we have been making iQ 2.0 scriptable with Python (www.python.org) the widely used open source scripting language that is popular in scientific, web and even games programming. We will refer to iQ 2.0 as iQ2-Py in future.

Some other key features which iQ2-Py will address are listed here.

- Threading and control limitations of the acquisition functionality of version 1.X.
- Simplified the GUI - removed the Protocol Wizard. Instead the user creates sub-protocols (timed channel acquisitions) which can be linked together into a master protocol for more flexibility.
- Parallel device communications will ensure that we achieve improved acquisition performance, essentially implementing each sub-protocol in an FLZ mode, but with Channels for flexibility.
- For the ultimate control, Python will allow initially direct sequencing of channels and FRAPP actions and in subsequent version it will allow direct control of individual device attributes.
- iQ-2Py will allow control of multiple cameras (and other devices) in one instance of the software, simplifying control and management of those systems.
- All graphics rendering will be implemented in OpenGL for performance and compatibility. Multi-pane Image windows will allow an image to be viewed by individual channels in a single window and MIP view is switched on or off by a checkbox click.

Python not only provides a Scripting framework for iQ2-Py, but also opens a rich world of open source scientific programming to our users. With applications such as NumPy (Numerical analysis tools) and the SciPy Scientific Python extensions (www.scipy.org), users will have much more freedom to develop extensions and take control of their data as never before. There are literally hundreds of extensions for everything from graphical presentation (matplotlib, Chaco), to molecular modelling and even parallel computing (<http://www.parallelpython.com/>) available and under active development. We look forward to an exciting new era of open computing with iQ2-Py.

New features in iQ 1.9

FRAPPA – software support was improved in version 1.8.1 and first made available in version 1.8. Once again we have improved its functionality by enabling multi-region bleaching both live and within a protocol. Multi-region FRAPPA is a right mouse menu item on the Image Window and is toggled on/off. When selected all regions will be bleached or activated, when off only the selected region will be bleached. To enable the mode of baseline collection followed by FRAPPA action and then recovery (classic FRAP) the user must Select a FRAPPA region. When no region is Selected the imaging Protocol continues uninterrupted. So the user can now decide at which times FRAPPA action should be initiated and whether all or just one region is bleached or activated.

FRAPPA is now available in Fast Protocols – but mouse down does block the sequence. iQ 2 will extend multithreading to avoid this issue.

FRAPPA has been made **independent of the PCU-100** series controller and now provides its own Blanking signal to the ALC Laser combiner.

FRAPPA Calibration Wizard now stores multiple calibration files for different hardware configurations.

Andor **Revolution CSU-X1, FRAPPA, TIRFM** solution is an example of a system requiring distinct FRAPPA Calibrations. Built on an IX81 microscope, our optical solution allows FRAPPA to be used with either CSUX or TIRFM. The CSUX detector is used on the left port, while the TIRFM detector is mounted on the right hand port. With a custom dichroic for the right port mirror FRAPPA can be used in combination with TIRFM illumination and detection. However, because the detection paths are dissimilar the FRAPPA angle to pixel mapping (Calibration) each must be stored in its own file.

The **ImageList** sorting bug has been fixed. You can now sort correctly by date, time, name etc.

A new **Filter PlugIn** is released with iQ 1.9 providing a range of 3x3 convolution and ranking filters. These included high and low pass and morphological filters - close (minimum), dilate (maximum) and noise removal (median)

Multi-Field ZDC and PFS capability has been added to the Scan control. One offset value is used for all fields.

ALC/AOTF controller has been enhanced to allow 0.1% laser power control and capacity for 5 solid state laser lines – see the ALC-501 series. Support for a new 594 nm laser line is now included.

CoolLED PrecisExcite LED source is now available globally from Andor and its distributors. It integrated into iQ and is available in a bundle configuration with Luca-S or Luca-R and workstation.

Device Setup – the **Record** function has been simplified by removing the drop-down list and providing a separate **New** button. On clicking **Record** the current channel settings are updated with those in the current device control panels.

CSU-X1 filter wheel speed control has been added to allow vibration reduction in sensitive imaging experiments.

Enhancements and bug fixes

Improvements have been made to the **Olympus IX81, Nikon T2000E and TiE, TILL iMIC microscopes and the Marzhauser stage** drivers.

The **Z drift problem** when using **Nikon PFS** in time-lapse and **FLZ** has been fixed.

New features in iQ 1.8.1

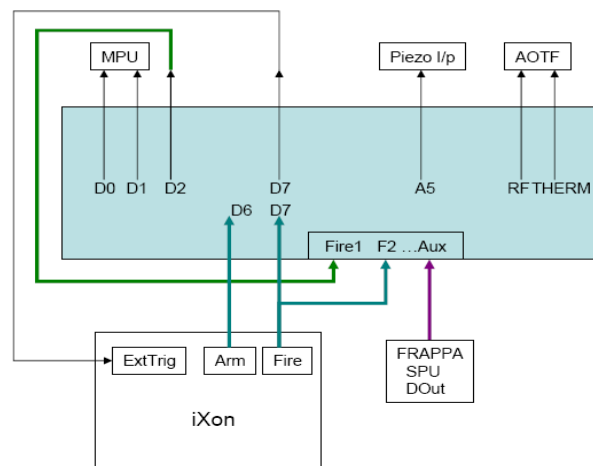
March 13th 2008

Introduction and highlights

FRAPPA – software support was released first with version 1.8 and as expected in the course of intensive use with the new FRAPPA hardware, we have learned from experience and in the current release provide many enhancements to performance, including:

- FRAPPING of points and rectangles has been made more robust and we have added the ability to FRAP **polygons with up to 10 vertices**, extending the flexibility substantially. This includes both convex and concave polygons. In a future version we will increase the number of vertices.
- The FRAPPA Calibration Wizard which maps image pixels to FRAPPA galvo angles has been enhanced to allow easy store and recall of multiple calibrations for different imaging port configurations e.g. confocal vs. TIRF or widefield. This will also prove useful for calibrating different objectives whose optical centers are always slightly different.
- The FRAPPA channel should control only the laser combiner and FRAPPA unit. In version 1.8.1 the FRAPPA channel can now be changed and “Recorded” from the Device Setup panel and maintain correct operation. This ensures switching time between FRAPPING and imaging is minimized.
- To ensure minimal “overspill” of region or point FRAPPING note that the active blanking connections communicated in the 1.8 release note must be used. See the figure reproduced below again to emphasize this point.
- Two bugs in rectangle operations have been fixed to ensure correct illumination time (multi-scan frequency calculation) and robust operation (a time-out error).

Revolution- New FLZ and FRAPPA/MPU PCU Connections



iXon FLZ improvements – FLZ control of the **Yokogawa CSUX emission filter** wheel has been added to the controller, ensuring optimal performance with the CSU-X. In addition some bugs from the recent introduction of improved sequence control have been fixed ensuring not only speed, but also robust operation!

Andor SDK - a new camera SDK version (2.80) is included in the 1.8.1 installation, which provides enhanced camera support, **especially for the new Luca R**, mega pixel EMCCD for budget-sensitive applications.

Prior ProScan II – Closed loop servo window control has been added to the ProScan controller. This enables the user to increase the servo loop error limit and ensures that a stage will not get into an oscillatory “hunting for zero” mode.

New Device Support ...

Polytrope for MA-TIRF on iMIC – TILL’s microscope has been enhanced to include control of the Polytrope module, which enables rapid switching between wide field and TIRF imaging. Polytrope also enables control of multi-angle TIRF and when used with Andor’s iQ and laser combiner provides a flexible multi-angle TIRF solution. As ever the iXon provides the most sensitive camera for TIRF imaging applications.

CoolLED PrecisExcite – LED light sources are attracting a great deal of interest in the microscopy community for reasons of longevity, safety and environmental protection. We will be distributing CoolLED and have therefore it has been integrated with iQ. It is a highly recommended device with excellent integration, performance and control, including the **Pulsed mode** used to minimize photo-bleaching. <http://www.cooled.com/precisexcite/index.html>

Sigma KOKI XY stage

Bug Fixes...

IX81 and Leica DMX - the iQ Olympus and Leica controllers clashed with new **CSUX** controller introduced in version 1.8. This gave rise to a “**Port 61**” error in channels, which has now been fixed. We apologize for any inconvenience this may have caused.

Sutter L10-C – A bug in the Lambda10-C and 10-3 firmware has been identified and corrected in collaboration with Sutter. The bug related to an incorrect reset pattern after loss of sync with filter positions 6-10. New **firmware version later than 2.20 fixes this problem**. We have embarked on a filter wheel replacement programme in cooperation with Sutter for all Sutter 10C and 10-3 wheels sold by Andor. L10-B and L10-2 controllers are not affected. Please let us know if you have experienced this problem – loss of sync between software and firmware position.

Orca ER/AG – A frame dropping problem with Hamamatsu Orca cameras has been tracked down to the DCAM camera drivers from Hamamatsu. Downloading and installing the latest version from www.dcam.com will address the problem for those customers running iQ with this camera.

New features in iQ 1.8

Benefits for Revolution Systems and All iQ Users

October 4th 2007

Introduction and highlights

Multi-threading – Andor iQ core and Plug Ins already use multiple threads to enhance performance and user control. As multi-core processors become the norm we continue to incrementally enhance all parts of iQ to take advantage of the inherent parallelism of these processors. **iQ 1.8** continues this theme and many of the new components announced here have been optimized for this operation.

New FRAPPA - Exciting new possibilities in confocal, TIR and wide field live cell imaging are made possible with the launch of Andor's FRAPPA laser photo-bleach and activation unit. FRAPPA is an XY galvo scan unit which delivers intense laser power to user-defined points, lines and ROIs for localized optical stimulation. Andor iQ 1.8 provides an easy to use, integrated control and GUI for FRAPPA. Modes of operation include (see www.andor.com for more information)

- Fast "point and shoot" mode for on-demand point and region Photobleach and Activation control. Switching time ≤ 10 ms.
- Insert new FRAPPA keyword into Protocols enables controlled bleach or activation in sequences for applications such as FLIP.

Andor iCam – New firmware for Andor iXon and Luca cameras was recently introduced (see www.andor.com), to provide significant improvements for multi-channel Live Cell imaging. iCam enables key camera settings (especially exposure time) to be dynamically adjusted and implements fast software triggers to achieve industry-leading frame rates. iQ 1.8 fully supports iCam capabilities and many iXon cameras can be field upgraded to enjoy these performance benefits. A CCI-23 controller card is required. Please contact your local representative for more details.

iXon FLZ improvements - A new sequence control approach allows us to overlap Piezo-Z settling with camera readout and simultaneously achieves enhanced frame rates and improved Z settling! In addition a number of bug fixes have been made to provide best performance in multi-channel frame averaging and precise interleaved bright-field frame capture. Please see the drawing at the end of the iQ 1.8 release note indicating necessary connections for optimum performance of the new FLZ.

Additional cables may be needed, so please contact your local representative if you have questions.

New RollingBall filter PlugIn has been developed for background correction prior to analysis. This works especially well for punctate features (e.g. single molecule data, foci or adhesion points). The background can be computed for each frame or for only the first frame and applied to all and the background can be output for averaging or other processing in mathematical image processing tools. This approach works well as a pre-processor for e.g. Tracking and Spot analysis.

FastMIP and 4DView improved GUI controls and robustness. Note that you may need to update the video drivers supplied with your workstation graphics card for best performance and reliability. Check the website of your graphics card supplier.

New Yokogawa CSUX1 – Andor will officially launch Yokogawa CSUX1 at the 2008 Neuroscience meeting in San Diego. Andor iQ 1.8 now supports all features all CSU models. CSUX1 is a new generation device whose highlights include enhanced illumination throughput and uniformity, user accessible dichroic mirrors and options such as motorized transmitted light path switch, emission filter wheel and second camera port and a high speed disk version which provides up to 10,000 rpm. CSU-10 and 22 units, whose performance remains class-leading, are still available.

Autofocus improvements – iQ management of Autofocus has been improved to handle hardware focus errors. On the rare occasions when an Autofocus device fails to find its target, iQ now returns to the last correct Z position. This gives Autofocus the chance to try again in the next call and avoids possible total loss of focus, making long-term time lapse imaging more reliable and robust. The performance has been extensively tested with TIRF imaging, where focus stability is critical.

Tracker has improved **GUI** and **Snap with overlay** features. **Maths PlugIns** - enhanced with Windows Message Processing during operations, making them more responsive to user input.

New Format Converter PlugIn – convert image bit depth formats and select normalization method.

New OME-TIFF import and export PlugIn – enhanced interoperability with OME compliant platforms.

New Cameras Supported

Andor Luca-R and iKon DU934 – iQ 1.8 provides support for the new Luca-R mega-pixel EMCCD camera (8x8 um pixels) and iKon DU934, 1kx1k back-illuminated CCD (13x13 um pixels). Both cameras operate on USB 2.0 interface standard, providing convenient and cost-effective acquisition platforms.

Photometrix Coolsnap series FW (Firewire 400B) – we recently released the iQ driver for this popular range of CCD cameras based on the Sony ICX285 sensor. Drivers for other fire-wire and competitive PCI products from **Hamamatsu, PCO and Q-Imaging** are also available.

New and Improved Device Controllers

Laser combiner support extended to allow support for more **Cobolt lasers** – now includes Calypso, Jive and Fandango with powers up to 100 mW.

Sutter L10-3 – The Lambda10 range has been extended to include a 3 wheel, 2 shutter model, which is now supported. This unit operates with Sutter Smart Shutter or Uniblitz devices.

TILL PolyChrome 5 from TILL now controlled via RS232 interface with optimized switching speed and control of power and bandwidth. This new controller makes use of multi-tasking for excellent performance gains.

iMIC modular microscope from TILL has also been enhanced use of multi-tasking to deliver new levels of performance. The current controller includes support for a USB joystick for comfortable XY stage motion control.

Olympus IX81/BX61 controller has been improved to minimize overheads associated with communications. This combined with internal buffering of motorized component settings delivers frame rates of twice those of the previous controller.

Nikon TE2000E control now includes previously missing transmitted light control and switch. PFS interface has been enhanced to allow continuous operation where the user requires it.

Leica 60000/4000 control has been improved to avoid recoding unnecessary settings during Channel set up.

Third Party and Open Source Platform Compatibility Update

One of our goals is to continually enhance **iQ data compatibility** with established and evolving image analysis and processing platforms. With this in mind we have an ongoing project to work with other

suppliers in the scientific field (including microscopy) and also to engage with research community-driven open source projects to ensure data exchange and mutual file format support.

Bitplane, AG creators of Imaris have implemented an importer for our multi-TIFF format, further enhancing cross-platform capabilities between our products. Thanks Bitplane! <http://www.bitplane.com>

Image-J We thank the team at UWI, Madison for implementing Andor multi-TIFF support within their Bio-formats library. Bio-formats is available in various forms including a plug in for ImageJ open source software. <http://www.loci.wisc.edu/ome/formats.html>

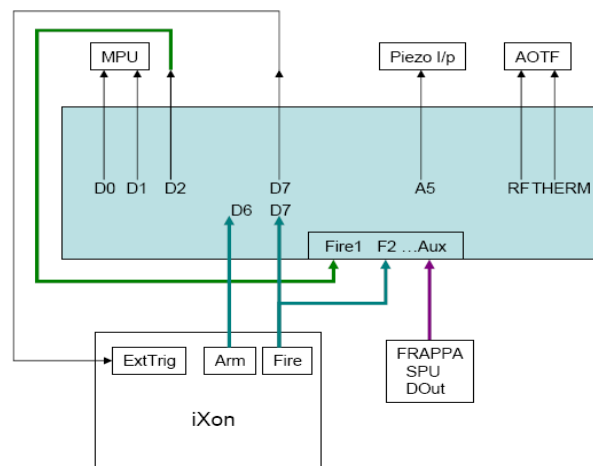
Micro-Manager – Our thanks to Nenad Amodaj and Nico Stuurman at UCSF for their work to support Andor iXon cameras. Our software team has contributed a new component to their open source acquisition Platform for Image J and we now maintain iXon driver support. <http://www.micro-manager.org>

New OME-TIFF import and export PlugIn – enhanced interoperability with OME compliant platforms. <http://www.ome.org>

Significant Bug Fixes

- Possibility of **identical channel labels** has been removed. This bug had the serious side-effect that once the channel are locked in acquisitions, the data had to be split and re-imported to change the labels. Identical labels makes channel analysis e.g. Ratio impossible to complete.
- Problems of crashes in Live mode with Field Split PlugIn have been resolved and enhancements to the flexibility have been introduced.
- Some FLZ bugs relating to multi-channel mixing while frame averaging have been fixed.

Revolution- New FLZ and FRAPPA/MPU PCU Connections



Release Note History Follows.....

New features in iQ 1.7

June 4th 2007

Introduction and highlights

Major new features in iQ 1.7 include the following:

- Support for hardware Autofocus systems from ASI, Nikon and Olympus. A new keyword can be added to the Protocol, either at the first page of the Wizard or later with a right mouse click at the Repeat keyword. Autofocus control operates in both time-lapse and FastLZ.
- A new OpenGL FastMIP and 4D visualization Plug In enables real-time interactive volume rendering, by making use of advanced graphics hardware capabilities of graphics engines such as NVIDIA and ATI-Fire.
- Improved control of iXon with Andor's new camera firmware included with the latest SDK. In FLZ new features include exposure control with wavelength, bright field image capture interleaved with scans.
- In time-lapse operation the new software trigger mode increases variable exposure frame rate up by a factor of between 2 and 5! Note that in order to take advantage of the new camera control a firmware update is needed, which can only be performed on cameras from serial number 2020 and requires the use of a CCI-23 controller card.

The "**Autofocus (n, on)**" keyword indicates that a hardware Autofocus action will be executed at the start of the acquisition sequence loop. The value (n) is a loop count parameter and specifies the frequency of the Autofocus action. If n =1, then Autofocus is executed on every loop, if n=2 then the action is on every other loop and so on.

Each implementation has its advantages depending on the application.

- ASI CRIFF relies on an IR laser diode and TIR at the cover slip-specimen/medium interface. It is a continuous feedback system integrated with a piezo Z stage or ASI controlled Z stepper. It can be left on during single Z series (time-lapse or fast mode). For Z scans it can be left on during time-lapse intervals and automatically switched off before a Z scan is executed. One of its main advantages is that it can be adapted to most microscope models.
- Olympus ZDC is primarily a one-shot system, taking about 800 ms to execute a "find" operation. It relies on detecting the reflection signal from an IR laser diode at the cover slip-specimen interface and in iQ we record an offset to be applied to the focus position found to remain at the optimal user-defined focus plane. The one-shot mode is executed by the Protocol based on the Autofocus command settings and this makes it suitable mainly for time-lapse and Z scan operations. It is a robust system, which can be retrofit but is compatible only with Olympus IX81 microscopes.
- Nikon PFS (perfect focus system) is a continuous Autofocus system, which can be integrated with only the most recent Nikon TE2000 microscopes. Because of its continuous operation and short cycle time it is more akin to the ASICRIFF and can be used in all modes of operation, time-lapse, fast time and Z Scans.

Absolute stage coordinates have been improved to avoid Z calibration if not required. Multi-field acquisitions, we introduced the MoveTo function on the Image Window right mouse menu to allow the stage to return to the coordinate on the image. This has now been extended to Single field images captured by Snap and Protocol execution.

New or Enhanced PlugIn functionality

The **3DView** PlugIn remains, but we have added 2 new visualization PlugIns. These use Cg and OpenGL programming to provide real time rendering of multi-dimensional data. **FastMIP** has been especially prepared to enhance data review during a time-lapse or FastLZ experiment and making use of Hyper Threading technology. Rendering quality is significantly enhanced using interpolation techniques for both z-series and zoom functions. Movie animation and **4DView** provide rendering speed of approximately 10X faster and will benefit directly from advances in OpenGL compatible graphic cards!

Tracker has been converted to an iQ PlugIn instead of a stand alone program. A number of bug fixes and enhancements have been made to this module, including a new tracking method. Including it as a PlugIn ensures that licensed users downloading iQ are assured of maintaining latest functionality. We will release a further enhanced Tracker later this year.

Dual ImageDisk PlugIn allows data from two PC's to be merged. This technique is used with two camera systems, where the cameras are externally synchronized so that optimal frame-rates can be maintained. This PlugIn allows alignment of the data sets during merge of the two data streams. The alignment parameters are setup in the new Field Split PlugIn, described in point 6) below.

Camera Alignment PlugIn enables precise mechanical alignment of dual camera systems. The PlugIn operates in either feature-matching mode or in overlay mode. In the former punctate features are identified in the specimen and iQ segments and computes their center of gravities, reporting their positions in XY and angle between the two. The user must align one camera to match the XY and angle between the two spots on both cameras. Multi-spectral beads visible in both channels should be used for alignment and it is advised that one camera should be flipped for the alignment to take into account the optical flip in the dichroic or polarization splitter assembly included in our Dual Port Camera Adapter.

In the overlay mode an image of one camera is captured and then accessed via the dual imagedisk to be shown as a static image which is overlaid with the Live image from the second camera. Interactive tools allow for image alignment.

Field Split PlugIn generates offset data for aligning either dual camera data (see 6 above) or field splitting devices such as Optosplit II, III, DualView or QuadView. Support for 2, 3 and 4 split ROIs on the same camera is supported. Improvements in both static and Live differential and overlay alignment have been made and rotation control is now available, making the PlugIn more robust and easier to use.

Image Math and Image-Image Math PlugIns have improved image naming convention.

New and Enhanced Device Controllers

FastLZ iXon driver –

- i) Now allows for phase/DIC image to be taken in each sequence. Z position can be set – single frame taken at Z position.
- ii) Bug fixes in Ext Start selection and delay at Start of sequence with 860.
- iii) FastLZ with frame transfer (FT) option, enables performance benefit of FT when used with external hardware trigger generator (ET). ET must produce consistent interval between trigger pulses as pulse interval sets the exposure time in this mode.

TILL iMIC - New support for the modular automated microscope provides control of all parameters including XYZ stage and piezo, objective turret, filter cube changers, bright field LED. A joystick control for the iMIC XY stage is now supported in iQ from any Windows compatible joystick. The control provides proportional control, with options on 3 maximum speeds – Slow = 1mm/s; Med = 5mm/s; Fast = 10 mm/s.

TILL Polychrome V enhanced support via RS232 mode as well the previous analog mode. This enables control of power and bandwidth settings as well as internal shutter.

Leica DM4000/6000 and DMI6000 microscope control has been completed with support from Leica. All motorized functions from this new generation microscope from Leica can now be accessed and controlled from iQ 1.7. We have also included control for the **Leica Macro Fluor Zoom** microscope and have supplied a Revolution system to operate on this powerful large specimen fluorescence instrument,

Nikon TE2000 microscope controller has been developed with support from Nikon Instruments US. The new controller supports all motorized functions on the instrument, including port switching, DIC analyzer slider and the **Nikon Perfect Focus** system. We will extend control to the Eclipse i-series upright microscopes in the near future.

Prior controller has been updated to allow for closed loop and open loop selection. Prior's Lumen is also supported in iQ 1.7.

Marzhauser controller has been improved to allow for closed loop and open loop selection. In common with all stage controllers, the unit now auto-calibrates on iQ startup or before a scan is executed.

Enhanced **Generic Shutter** device now supports RS232 control of Uniblitz VM series controller as well as LPT port output on suitable PC's.

Improved **Laser combiner** operation is supported in iQ 1.7. This includes Active Blanking for absolutely minimized specimen exposure. **International Laser safety** requirements have been complied with using a new ALC driver which indicates when laser emission from the ALC is active.

Support for multiple **XY and Z stages** has been added. iQ allows the user to select the device to be used for a scan. This is implemented to allow use of stepper plus piezo stages.

Some significant bug fixes

- The Channel DeltaZ bug has been fixed – it was not being operated correctly.
- Kymograph Access Violation on Delete All has been fixed.
- Montage Access Violation when launched from Protocol has been fixed.

Andor iQ Release notes version 1.6

November 2006

KIDAndorLZRTA

Prior filter wheel support has been added to FLZ mode. This enhances upgrade performance of Perkin Elmer RS systems.

Till Polychrome monochromator support has been added to FLZ to enable optimum support for fast imaging. Andor recommends the TILL monochromator as a fast, bright, flexible and quiet optical source.

Andor SDK

In dual iXon systems there was an initialization problem in FLZ mode, which has been fixed with the release of SDK 2.76, included in this version of iQ 1.6.

SDK 2.76 also improves Luca performance regarding time out in Live issue.

One other occasional time-out error problem has been tracked to IRQ sharing. If this is a repeatable problem we recommend moving the CCI card to a new PCI Slot.

Yokagawa

CSU21 support bugs have been fixed and CSU21 can be selected in the device settings tab. Note the CSU21 requires a delay of a second or two to change and stabilize speed.

In CSU22 we have added an option to control DM and EM/BA filters separately, allowing more flexible operation. The filters can also be "Linked" to enable the original mode, where the 3 are changed together.

ALC - Andor Laser Combiner

The ALC was discovered to have a limiting effect on speed in fast imaging, due to a counter-timer error. This has been fixed and now allows much higher frame rates in FLZ mode with binned, short exposure imaging.

ASI stage support

Absolute stage coordinates have been added to the ASI controller to allow correct control and Montage scan capability. We have also disabled front panel buttons to avoid e.g arbitrary Zero setting which is in conflict with an absolute coordinate system.

Cairn mono

A problem with support for grating density-setting 2000 has been fixed.

Olympus Scope

Improvements have been made to the operation with the IX81 and BX61 microscopes. A stage interface has been added to allow z to be disabled – e.g. if in use with a piezo for Z scanning or if motorized parts have been added to an IX71, which does not include Olympus Z drive, but third party stepper. Motorized switching the bottom port has been implemented. The new IX/BX controller uses the latest Olympus SDK (July 04) for control.

Other bug fixes.

Andor iQ 1.5 Release Notes and Plans

July 2006

1. New features

iQ 1.5 follows quickly on the heels of 1.4 and 1.4.1 and 1.4.2. This version will fix the issues created by conversion to absolute stage coordinates and provide some significant improvements. We expect this to be the last release before version 2.0, which is planned for launch at ASCB in December. The following is a list of main features added to iQ in version 1.5 – no special order.

Multi-camera support - imaging systems with more than one modality e.g. TIRF and CSU. This allows the user to register more than one iXon camera in a single instance of iQ and the user can specify which camera will be used in a Protocol. Cameras must be used sequentially, not simultaneously. The keyword **Camera Selection** is used in the Protocol.

Simultaneous dual-camera support - requires two PC systems, one acting as master. Using the master to provide external triggers the cameras can be synchronised to within 2 microseconds and we can supply an iQ PlugIn (runs on master) to merge data from the two PCs. We now manufacture dual C-mount camera adapters for two wavelength imaging.

New FastLZ capabilities:

Andor Laser Combiners – support for external laser combiners e.g. UltraView upgrades. This allows control of up to 5 laser lines.

Sync bug and scrolling – a bug in SDK 2.75.0.0 has been addressed in this release (2.75.0.5 included in the installation). Scrolling and sync Issues between DV885 and CCI-22 resolved.

ImageView – control for Image Zooming has been enhanced, providing independent Zoom in and Zoom out tools with a Zoom multiplier of sqrt (2). AutoZoom fits the image into the current Window size and a User-Defined Zoom is available from a right mouse menu on the Image – Select Tool/User Def.

Image Mapping (Scaling) – responsiveness has been improved and Automap is switched off automatically if the user tries to drag the cursors in the Mapping dialog.

Montage scanning has been extended to provide a Linear mode in which the user defines only start and end point of the scan region and iQ fits a line of overlapping fields. This will be beneficial for those imaging linear features in areas such as DNA combing. Montage can be used with Z-scanning and also in Time lapse operation for studying large specimen 3D structure and/or development.

Montage View PlugIn has been improved to provide (optional) pixel matching algorithms, which perform correlation matching between the overlapping regions of montage scans. The performance (provided there is contrast available) is pixel perfect and the user can specify the stage precision (defined in micron rms) so that the search area can be limited and speed optimized. Other options allow a brightest overlay method to minimize image shading effects. Montage capability is available only to users who have the iQ-MF (multi-field) option.

Stage Alignment - Wizard has been improved using enhanced search algorithms. This is important for Multi-well and Montage imaging for correct results. Users of **earlier versions of iQ (or AQM)** will need to redefine all scans to ensure correct operation.

Stage Registration - When iQ starts a stage registration step is needed to establish “Home” or stage zero position – this now includes a focus step so a test slide is needed. Further warnings help to avoid damage to expensive objectives.

Move To has been added to the Right Mouse menu on the image window, when the image showing has been created with a Scan or Montage. iQ will take the stage back to the coordinates specified by

the mouse and when you go Live you will see the feature at that location on the current specimen. This is possible now that absolute stage coordinates are used.

Adjust Focus– A right mouse click on the Scan position in the Protocol can be used to adjust the focus of all fields in the scan. This is useful for correcting focus drift in a time lapse acquisition. To Adjust Focus while a Protocol is running click on Live, then in the Protocol Tree expand the Scan and at any field position right mouse click and select Adjust Focus from the pop-up menu. The system will move there, you can adjust the Z range or position and then when you select Next iQ will exit the Wizard, adjusting all Scan Z values by the offset. When you click back to Idle the system should rescan the current time point from Field 1 and then continue. The Adjustment is rippled through all fields Z positions, making it suitable for compensating instrument thermal drift.

File Manager – File handling has been enhanced, iQ now writes a *.txt file (same name as image) containing image details when any Image is saved.

2. New devices drivers and hardware support

Olympus IX81 and BX61 - improvements to Olympus IX81/BX61 control OCX have been made, making control of the microscope from iQ smoother and more robust. A new layout for the keypad has been adopted in line with more recent documentation for default settings from Olympus, Tokyo.

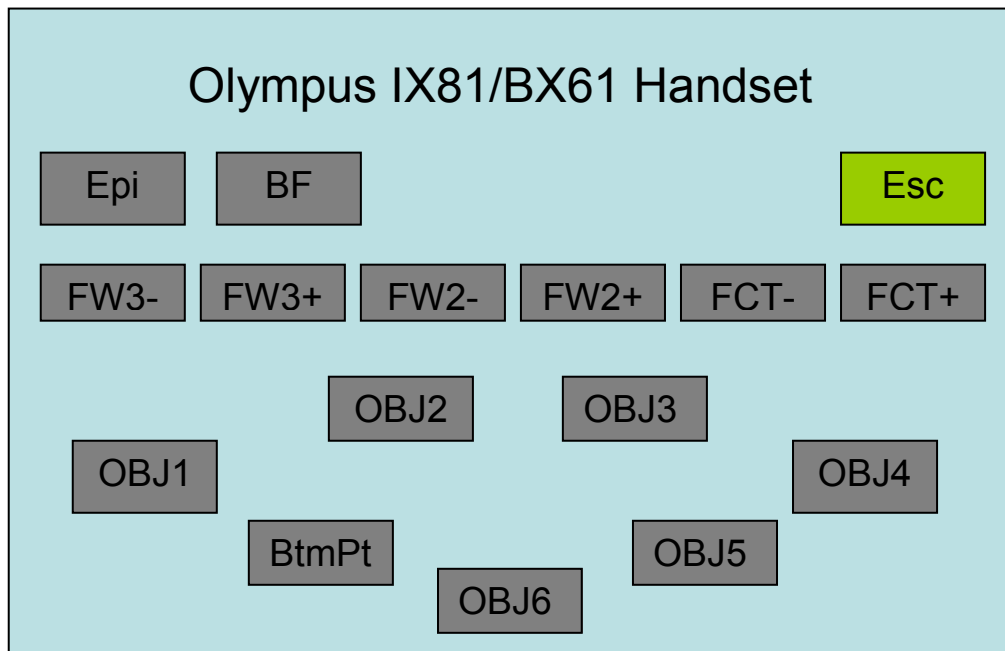


Figure 1 New Olympus IX81/BX61 Handset control button actions while iQ is running.

KEY:
• Epi – Toggle Epi Shutter
• BF – Toggle Bright Filed Shutter (if present)
• Esc – Escape – Drop Objective turret for safe change.
• FW3+/- – Filter wheel 3 increment and decrement (if available).
• FW2+/- – Filter wheel 2 increment and decrement (if available).
• FCT+/- – Filter cube turret increment and decrement (if available).
• OBJ 1...6 – select objective (turret position).
• BtmPt – Bottom emission port if present.

Physike Instrumente – PIFOC controller model E665 support has been improved, so that iQ can now control the P721 and P725 objective positioners to provide 100 and 400 um travel respectively. This module will also provide analog control to PI and other piezo devices such as Piezo-Jena and MadCity Labs piezo Z stage.

3. Key Bugs fixed

- Acquisition calibration being applied to Image Window.
- Image scrolling at binning > 1. SDK 2.75.0.0 fix.

4. Forthcoming Patches and Plans for iQ 2.0

Here are some of the things you can expect in forthcoming patches:

- New device support planned for Nikon LUSU – TIRFM laser illuminator.
- Leica DM-4000 and DMI-6000 driver.
- Tracker as an iQ PlugIn, with new features and bug fixes.
- Illumination “flat-field” correction to improve Montage rendering and segmentation for Spot analysis and Tracker.

Later this year we plan to issue iQ 2.0, which has a more modular architecture and provides SDKs for Auxiliary Device driver development, as well as camera and PlugIn SDKs. We have already begun work and plan improvements in 4D visualisation and analysis, which is core to **Andor’s Revolution** confocal product range and multi-dimensional imaging in general.

Andor iQ 1.4 Release Notes and Plans May 2006

1. New features

The following is a list of main features added to iQ in version 1.4 – no special order.

Montage scanning allows iQ to capture images from a user defined region of the specimen and then to “stitch” these together to create a high resolution view of that region. As scanning proceeds the focus plane is adjusted from user-defined reference points to ensure optimal focus is maintained across the whole scan. Montage can be used with Z-scanning and also in Time lapse operation for studying large specimen 3D structure and/or development.

Montage View Plugin implements the rendering or “stitching” and can be activated from the Protocol Tree. Images created in this process can be viewed, analysed and processed like any other nDim in iQ. Montage capability is available only to users who have the iQ-MF (multi-field) option.

Stage Alignment and Registration - a new Wizard has been added for those users with motorized stages to ensure that camera and stage X,Y coordinates are collinear. This is important for Multi-well and Montage imaging for correct results. Users of **earlier versions of iQ (or AQM)** will need to redefine all scans to ensure correct operation and to take advantage of these new features. In addition Scan users should note that we have now implemented absolute stage coordinates in iQ. This means that you should be able to return to the same point on a specimen between sessions. It also means that when iQ starts a **stage registration** step is required to establish the “Home” or zero position.

Calibration has been enhanced allowing a new “Automatic” mode. In this mode the user selects the objectives available on their scope (along with any Optovar and/or C-mount magnifications) and then selects the camera in use. The Calibration Manager then computes the effective pixel size for all objectives lenses in a single step. Interactive calibration with a graticule or haemocytometer can still be used. Predefined tables store microscope objective magnifications (and color codes) and camera pixel sizes for ease of use.

Acquisition Calibration - applies the selected XY values to all data acquired from the camera(s) via the Snap or Protocol execution.

Edit-Calibrate – allows you to calibrate the current (displayed) image from the list of calibrations available. This process has been separated from acquisition calibration for clarity and to avoid inadvertent changes in calibration, which were possible in the previous global calibration method..

Z-Scan – Z scans can now be adjusted each time the Protocol is run to adapt to varying sample depth. Nyquist and Cubic voxel scan options have been added for the selected objective lens.

iXon driver and FastLZ – a major effort in this component delivers many new features including enhanced GUI, extra trigger modes and support for components central to the **Andor Revolution** confocal systems. **Tips** provide suggestions on how to improve performance when required.

New FastLZ capabilities:

12, bit, Linear and Real EM gain supported for iXon+.

Fastest - streams images into RAM to achieve maximum speed at frames greater than 50 fps. This proves very useful for sub-arrays and/or iXon 860 users achieving optimum frame rates.

External Start – minimizes trigger to first frame delay in Fast Time protocol - delay. Requires TTL input to camera Ext Trig.

Frame Averaging – Acquire images with average of 2 to 256 frames for SNR improvement.

Exposure time control - GUI has been simplified.

M x N Binning – independent X and Y settings with binning factor up to 16.

Anti-ageing - time-out in Live mode.

Ludl and Sutter - emission wheels in Fast LZ.

Andor Laser Combiners – support for the Andor laser combiners (models 103, 104, 153, 401 and 421) has been added to Fast LZ providing rapid shuttering and intensity control via the integral AOTF.

Simultaneous multi-laser excitation – ALC control allows simultaneous selection of multiple laser lines..

Go To Center Z – two new controls have been added to the Sequence tab - one goes to center of piezo range, the second goes to center of scan. Piezo range is now user-defined allowing support for the increasing range of devices in the market e.g. 100, 200, 460 um.

External shutter control – enhanced in the Fast LZ Timing tab, with transition timing – suitable for Uniblitz and Smart Shutter drivers.

TTL Input/Output Control - enhanced and extended in Fast LZ. A parallel thread monitors external events continuously, minimizing lost events.

Sequence GUI – enhanced to support new devices and improve layout. The Lambda control has been improved to allow easy switching between different illumination/emission controls.

Bugs - All known bugs have been fixed.

Episodic Averaging PlugIn

A number of episodes or sequences (commonly triggered to ensure precise time alignment) can be averaged to improve SNR. Sequences are typically gathered with a recursive Protocol, using Load Protocol to reload and generate a number of (near) identical episodes. The PlugIn also provides Photobleach or baseline correction.

Kymograph PlugIn – Lamella Mode

A new “Lamella Mode” has been added to the PlugIn which is intended to ease the analysis of lamellapodia protrusion and contraction rates in cell signalling, motility and membrane ruffling studies. The new mode allows the user to draw a series of lines in the XY plane (or MIP) to create a set of kymographs which can be further probed with the poly-line tool. The slope of each poly-line segment delivers a protrusion or contraction rate which is reported into a data table, ready for export into a tab delimited text file. This tool has been used by one of our beta site testers for several months and has helped to deliver rapid and accurate analysis.

Time-lapse – Protocol length (duration) can now be set by time as well as frames. **Elapsed time** is now reported during a protocol in the acquisition status panel.

File Manager – Fix to SIF file reader. Enhancement of Single TIFF file export to include time and other dimension stamps, allowing reconstruction of data in third party software that cannot read/interpret ABD multi-TIFF files.

Saving images with Overlays – Movie editor now allows a Save option to single 8/24 bit TIFFs and by using the Stamp tool image parameters such as Time point, Z position etc can be burned into the image. This allows transfer of data to 3rd part image analysis programs.

ImageList Save - options enhanced to allow multi-image export to single 8/24 bit TIFFs. Note that ImageList details can be Copy/Pasted into text files as required.

Hot Keys – there is now one Hot Key Settings saved for each hardware Configuration.

Copy to Clipboard from Grids – Analysis, RGB and Spot tools now have a right mouse pop-up menu to data from selected cells to be Copied to the Clipboard. The data can then be pasted into other applications e.g. Excel.

Configuration Manager – the Local administrator restriction has been removed from configuration manager. Now any user can create a Configuration. Changing global setting is still restricted to local administrators to avoid inadvertent changes that will affect all users.

Power Out Protection – on receiving a shut down signal from Windows iQ now has a timed response window to allow for closure on impending termination. This allows for a clean exit following UPS closure in power outages.

2. New devices drivers and hardware support

Andor Luca - our entry point EMCCD camera is now supported under the iXon camera OCX.

iXon+ - New features for Andor's flagship imaging camera including linear EM gain.

ALC-400 series – A new driver for the Andor multi-line solid state laser combiner provides control and monitoring by iQ in both Time-Lapse and FLZ modes. An integral AOTF is used to provide microsecond shuttering and intensity modulation via the PCU-100 series.

Ludl - 10 position filter wheels and triple shutter control is now supported. Speed improvements have also been made. The new driver provides support for the MAC2000 legacy controller for filter wheels and XYZ stages.

NOTE: When using both the MAC5000 and 2000 controllers the Z motor address must be set to "6" on the Z controller card.

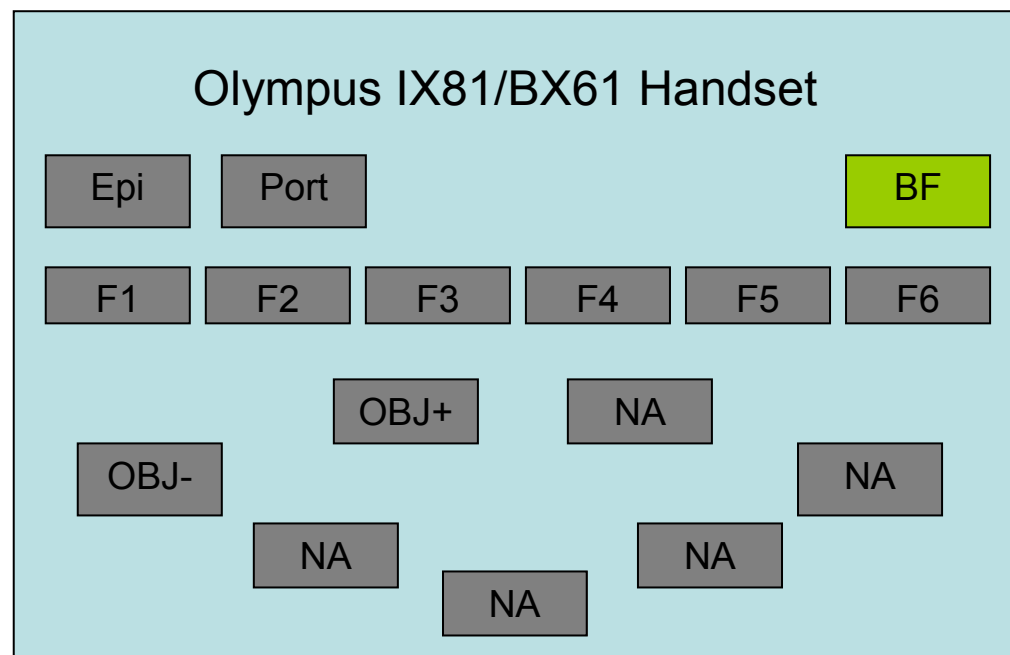


Figure 1 Olympus IX81/BX61 Handset control button actions while iQ is running.

KEY:
• Epi – Toggle epi-fluorescence shutter.
• Port – Switch emission port – side, ocular, {bottom, right}.
• BF – Toggle bright-field shutter.
• F1...F6 – Select fluorescence turret filter position (1..6).
• OBJ ⊖ - Decrement objective turret position i.e. current -1.
• OBJ ⊕ - Increment objective turret position i.e. current +1.

Olympus IX81 and BX61 – GUI and control improvement - iQ now controls the transmitted light on/off if no shutter is available. Handset control enabled while iQ connected to microscope – for HS button assignment see Figure 1 above.

Physike Instrumente – PIFOC controller model E665 support has been improved, so that iQ can now control the P721 and P725 objective positioners to provide 100 and 460 um travel respectively.

Sutter DG5 – the DG4 driver has been extended to support the DG5 in RS232 control and to handle the Smart Shutter as a stand alone device.

Sutter - Smart Shutter – confirmed functional via RS232 control using both DG4/5 and Lambda-10 FW drivers. If a stand alone Smart Shutter is used with a Lambda 10-2 for example, then the DG4 driver is loaded and the Smart Shutter Device is selected on the Settings tab.

Yokogawa CSU – the CSU22 driver has been enhanced to ensure correct synchronisation between the GUI and the device. A CSU10 control option has been added which enables the shutter to be controlled from a PC LPT1 (parallel) port.

3. Key Bugs fixed

- Random vcl40 canvas error in exposures ≥ 1 s.
- Zero default baud rate for PIFOC E665 controller.
- Frame orientation error in Snap FLZ.
- Shutter opening too early in Fast Time series.
- Movie Editor saving with Overlay error.
- Overwrite of existing movie file fixed.
- Abort in Image Allocation breaks subsequent Live or Snap.
- Fix to SIF file reader to allow loading of sequences from MCD/Solis up to 2GB.
- Demo mode start up error.
- Multiple Save from ImageList “Delete after Successful Save” response options.
- Spot threshold and feature delete bugs.
- Shutter opens too early in “Pause”, “Delay” or “Trigger In” to Start.
- Events are now cleared after a Protocol has been completed.
- Shut down Chart 50 error.

4. Forthcoming Patches and Plans for iQ 2.0

As with all software projects, there is no end to the possibilities, but at some point we have to call a halt and make a release. Thus iQ 1.4 delivers much, but leaves more to do. Here are some of the things you can expect in forthcoming patches:

- Leica DM-4000 and DMI-6000 driver.
- Tracker to be an iQ PlugIn, with new features and bug fixes.
- Illumination “flat-field” correction to improve Montage rendering and segmentation for Spot analysis and Tracker.
- Multi-camera support for imaging systems with more than one modality e.g. TIRF and CSU.

Later this year we plan to issue iQ 2.0, which has a more modular architecture and provides SDKs for Auxiliary Device driver development, as well as camera and PlugIn SDKs. We have already begun work and plan improvements in 4D visualisation and analysis, which is core to **Andor’s Revolution** confocal product range and multi-dimensional imaging in general.

Andor iQ Release notes version 1.3

November 2005

Installation Improvements

In previous installations three steps were required for the three software components – Andor iQ, PCI card driver and iXon camera driver. In the current release these steps have been integrated into a single iQ installation with the latest Andor SDK 2.73 included. This should make download and deployment simpler and faster. This version will appear on ftp.andoriq.com for download by Friday November 11th.

Summary of Software Improvements

- **Andor iQ.exe**
Fixed Standard Deviation bug in Thru Series analysis. Increase number of fields in user defined scans from 99 to 9999 fields. Improved Device Setup dialog for New Channel. Fixed on-line ratio bug. About box reflects Andor iQ release version (as well as build number and date).
- **Andor FLZ.ocx**
Wavelength support extended to DG4, Cairn and Kinetic Monochromator and AOTF. Improved performances regarding speed, synchronization and user interface.
- **Ki001comp.bpl**
Decouple display and acquisition for flexibility using messaging. Also allow the display update message to monitor the pixel value under the cursor. Improvements to Scale bar, other annotations and ROI operations including Paste and Default settings.
- **mm40.dll**
Speed up image allocation for long sequence acquisition. Fix to Abort button - now terminates image allocation. Increase Image XY size limit from 4kx4k to allow up to 2GB per frame. Remove 2GB warning message.
- **fm40.dll**
Fixed bug in Andor SIF file loading. Set 2GB limit on SIF file load.
- **AOTFcontroller.ocx**
Support AOTF control for both Fast LZ and standard Time Series. This supports Andor's laser combiner products (requires PCB 100 series) and some 3rd party AOTFs.
- **Lvpzt.ocx**
Support for Physike Instrumente PIFOC devices extended to E665 as well as E662 controllers. In addition to RS232 both now have a direct voltage control mode (DAC).
- **Cairnmono.ocx**
Cairn Research OptoScan is now support under our standard card PCIM-DDA06/16 MC DAC board in both FastLZ and Time Series mode. Continued support DT331.
- **Priorcontroller.ocx**
Clean up of user interface.