DIFFRACTION

ASTRONOMY + SCIENTIFIC IMAGING SOLUTIONS

INCREASE YOUR OBSERVING EFFICIENCY

Introducing MaxIm DL Maestro, a game-changing new capability for our Cyanogen Imaging® MaxIm DL Pro, the gold standard in astronomical image acquisition and processing software.

MAESTRO FOR IMAGING HARMONY

Maestro brings the ability to synchronize multiple simultaneous cameras under leadership of a primary imaging system. This allows you to achieve results more quickly, and to substantially increase the number of images that can be taken per night. Drive your imaging productivity to new highs.

Diffraction Limited has developed this new solution in concert with customers who recognized our work with the Dragonfly Array Telescope and other multi-camera systems, whether using our SBIG CCD or SBIG CMOS cameras or third-party equipment.

An observer or telescope operator designs an observation plan to take advantage of multiple imaging systems, sharing a common telescope mount. The primary imaging system is the leader, taking images and providing coordination to the subordinate image systems running their own imaging tasks.

Maestro leads the subordinate players in concert, much as the conductor of an orchestra leads the musicians with their own instruments. Unlike a symphony conductor, it also performs its piece on the primary imaging system.

The lead imaging system runs MaxIm DL Pro with a Maestro server, and each subordinate runs an instance of MaxIm DL Pro with a Maestro client. Like a band leader, the Maestro server gives cues to all interested Maestro clients and checks that the slowest client is ready to move to the next part.

The Maestro leader does not command or control the clients; instead, each player is autonomous, following the time guidance from the server, doing their best to complete their task within the time allotted, and notifying the leader when done.

Maestro does not manage the observing activities of the client; these can be completely independent. As all the cameras are following the Maestro server on the leader, you can dither your auto-guider, or slew between exposures, without any risk of your images being ruined by the telescope suddenly moving.

Maestro makes sure that all cameras have closed their shutters and completed activities before moving on to the next step. Maestro also allows the cameras to take different exposure durations; for example, the lead imaging system can be taking ten-minute exposures, while at the same time the other cameras can be doing up to five individual two-minute exposures.

Preparing a new Maestro camera array is done by defining a new MaxIm DL Pro configuration for each camera/imaging system. A leader is defined among these configurations, often the one running the longest exposure. In a narrowband Hubble Palette array, the "darker" SII filter would be associated with the leader as the camera will need to run longer to obtain a good photon count and signal-to-noise ratio.

The Hydrogen alpha would be next, and the OIII filter will usually pass more photons in the same amount of time. For traditional CCDs, a Red-Green-Blue (RGB) array would have Blue with the longest exposure time, so it would lead. The Luminance+RGB might use Luminance as the leader, followed by Blue-Red-Green cameras.

For software experts interested in the underlying technology, Maestro uses a Representational State Transfer (REST) software architecture to perform the coordination. This allows for future possibilities.

YOUR COUNTLESS POSSIBILITIES

ONE-SHOT ARRAY OF MONO-BAND CAMERAS
One camera for each unique band pass filter, such as a Hubble palette narrowband set (SII, Hα, OIII), or one camera for Luminance, Red, Green, and Blue, on separate telescopes on a common mount.

ARRAY OF IDENTICAL OFFSET CAMERAS
Cover more sky at the same time for a wider field. Meteors, comets, wide field images or Space Situational Awareness applications may use this capability.

ARRAY OF IDENTICAL ALIGNED CAMERAS
Cover the same area of sky with more effective total aperture. These can be used in applications for deep discovery —similar to the Dragonfly Telephoto Array, cover more sky, more deeply, more cheaply than large telescopes. Or use it to reduce noise and sensor-specific issues.

ARRAY OF DISSIMILAR CAMERAS
Trigger multiple cameras with unique capabilities, such as differing field size, quantum efficiency and spectral response. Run a DSLR while doing your science—take wide-field pictures with a consumer digital camera while the CCD and main telescope are imaging a narrow field.

DOUBLE-UP
Maestro can run multiple-instances of MaxIm DL Pro on the same computer. If you have 2 imaging cameras and 2 telescopes on one mount, you can run these at the same time.

NETWORKED NANO COMPUTERS
Maestro can run instances on subordinate computers connected using TCP/IP networking. Use a nano-PC for each camera and instance.

WHAT YOU NEED TO GET STARTED

MaxIm DL Maestro is an upgrade to the next level of MaxIm DL Pro software. You need one Maxim DL Maestro server licence for the lead imaging system, and one client license for each subordinate.

The minimum hardware configuration would require 2 imaging cameras, in addition to the guider on the lead system, and sufficient PC resources to run 2 instances of MaxIm DL Pro, in addition to your other software. When running multiple identical cameras, the driver must support configuring which camera is to be used for each instance.

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+1 613 225 2732
info@diffractionlimited.com

59 Grenfell Crescent • Unit B, Ottawa, ON
K2G 0G3 • Canada