



Rescan Confocal Microscope



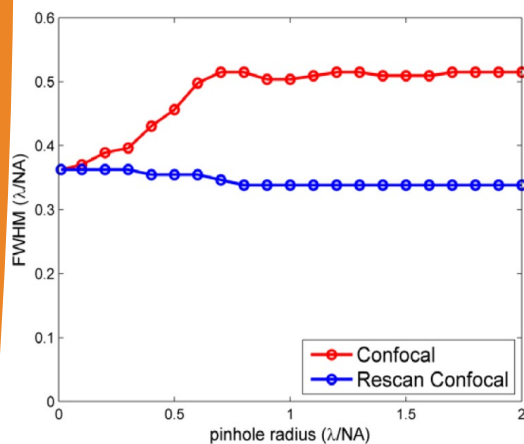
Double Dutch: Bright Resolution

- Improved Lateral Resolution of 170nm
- Better Signal to Noise Ratio and High QE
- Open System Architecture
- Deeper Confocal Z-Sectioning
- Affordable Budget

RCM Principle

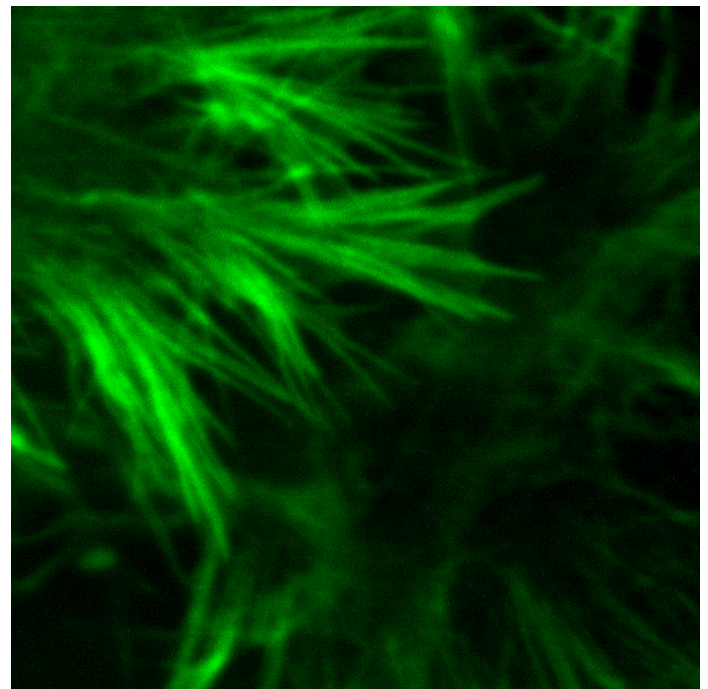
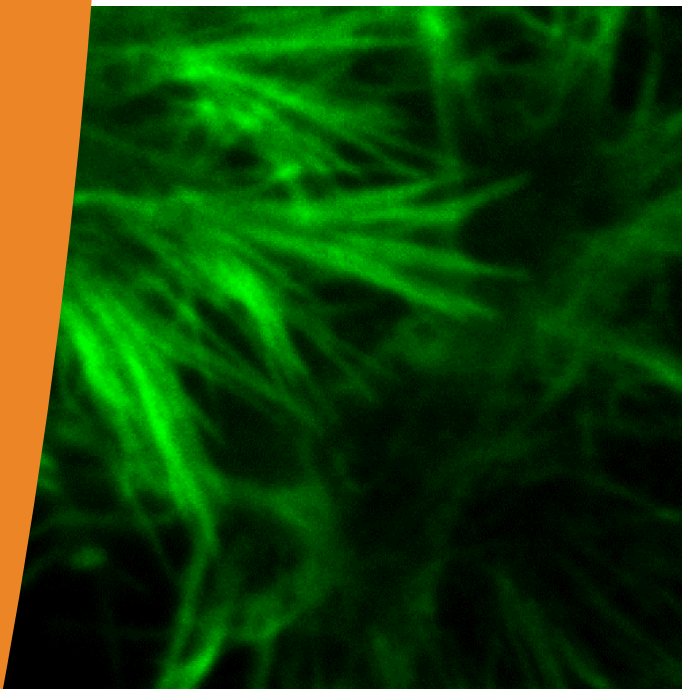
The system architecture of the RCM provides a standard C-mount interface with microscope and camera. The RCM includes two scanning mirror sets: the scanner and the re-scanner. While the scanner scans the specimen, the re-scanner writes the emission signal on the camera chip. By doubling the sweep of the re-scanner, the RCM image has an increased resolution. Because the RCM is based on opto-mechanics only, no post processing is needed to achieve the high resolution images.

As described in "Re-scan confocal microscopy: scanning twice for better resolution; G. M. R. De Luca, R. M. P. Breedijk, E. M. M. Manders et al. Biomedical Optics Express 4, 2644-2656 (2013)", this improved resolution is pinhole independent and therefore a strongly enhanced photon-efficiency (and lower photo-toxicity) is observed. Additional deeper confocality in the sample is established.

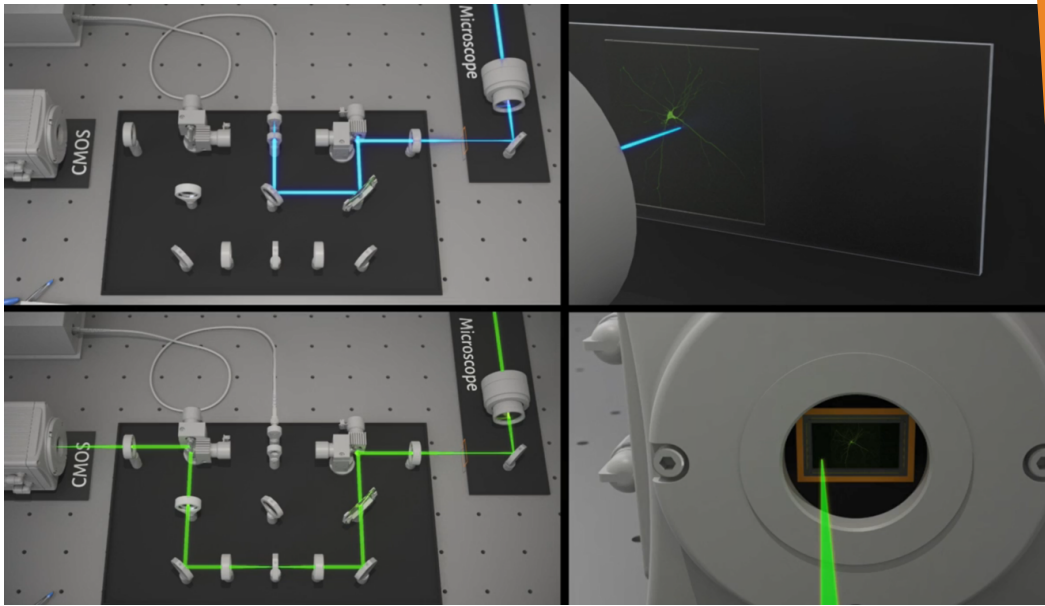


	Theory	Experiment
Confocal, pinhole 0.2 AU	168 nm	184 nm (± 17 nm)
Confocal, pinhole 1 AU	208 nm	220 nm (± 21 nm)
Confocal, pinhole 2 AU	212 nm	246 nm (± 19 nm)
RCM, pinhole 2 AU, M = 1	234 nm	245 nm (± 15 nm)
RCM, pinhole 2 AU, M = 2	162 nm	170 nm (± 10 nm)

Data from abovement article comparing resolution with various pinhole sizes for both confocal microscopy and RCM.



Comparison between standard confocal microscopy (left) and RCM (right). RCM gives resolution improvement by a factor of $\sqrt{2}$.

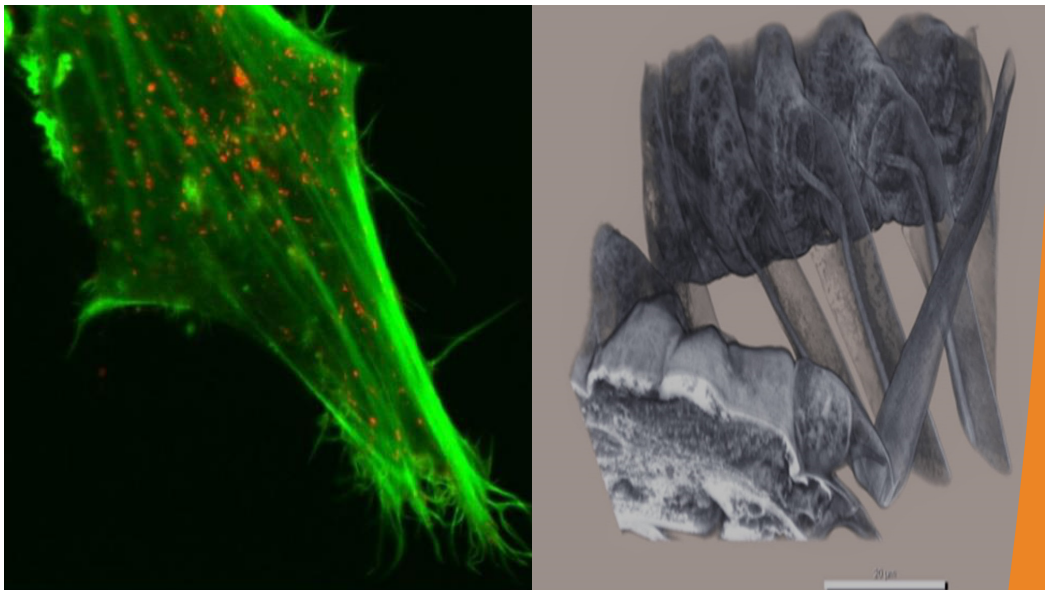


In the RCM unit, the excitation path is similar as traditional confocal systems (the blue light path in the image above).

The unique feature of the RCM is based on the additional re-scanning mirrors used for the emission fluorescence (the green lightpath above), which is written on a sensitive camera chip.

Together with the open pinhole ($AU=2$), this provides a exceptional image with high resolution and superior signal to noise ratio.

The lateral resolution of the RCM is increased to 170nm compared to 240nm of regular confocal microscope and the signal to noise ratio is 4x better.



Multi-channel image and 3D reconstruction with RCM.



Improved Lateral Resolution
170nm compared to 240nm of regular confocal microscope



Better Signal to Noise Ratio (SNR)
Detector with more than twice higher QE of regular confocal microscope and 4x better signal-to-noise ratio



Open System Architecture
Camera and microscope connect by standard C-mount coupling and laser with single mode fiber



Z Sectioning
The re-scan principle provides confocality deeper in the sample



Budget Friendly
The unique camera based design is very affordable

Specifications

Lasers	Support up to 4 laser lines: 405, 488, 568, and 638nm
	Additional laser wavelengths upon request
	3rd party laser combiner supported
Microscope	Laser output through single line fiber (FC Connector)
	Standard microscope with C-mount adapter
	Major brand microscopes supported
Camera	Hamamatsu ORCA-Flash 4.0
	Other major EMCCD/sCMOS camera supported
Features	170nm lateral resolution
	600nm axial resolution
	1fps (@ 512 x 512)
	50um (2.2 AU for 100x objective)
	Optimized for 100x, 60x and 40x objectives
Software	Image acquisition software included
	Other major image processing software packages supported