# ZEISS LSM900 Airyscan 2 Detailed Description

The Zeiss LSM900 Airyscan 2 confocal is a single fully-integrated stand-alone system consisting of a confocal scan head mounted on the side port of a Zeiss Axio Observer inverted microscope. The microscope stand is fully motorized and includes a motorized stage, DIC optics, and an LED illuminator. The confocal scan head features auto-calibrated galvometric linear scanners with a continuously adjustable pinhole, two high-sensitivity GaAsP PMT detectors, and one Airyscan 2 detector. The Airyscan technology permits a spatial resolution 1.7-fold beyond the diffraction limit in X, Y and Z and an 8-fold improvement in signal-to-noise ratio. Built-in variable secondary dichroic mirrors allow for fine adjustment of the emission bandwidths from 450-650 nm in 1 nm increments. Filter wheels allow additional flexibility in the selection of emission bandwidths if necessary. The scanner permits frame-wise or line-wise scanning at resolutions of up to 6144x6144 pixels with the GaAsP detectors, and 4096x4096 pixels with the Airyscan detector. The scan area is adjustable and freely rotatable. Hardware scan zoom can be adjusted in 0.1x increments from 0.5x to 40x. The laser launch contains four solid-state diode lasers with violet (405 nm, 5mW), blue (488 nm, 10mW), green (561 nm, 10 mW) and red (640 nm, 5 mW) laser lines. Laser line switching is achieved through direct modulation of the laser power with a dynamic control range of 10,000:1. To extend laser life, the diodes are on standby until the software specifically engages them. The system is capable of imaging at speeds of 8 fps using the GaAsP PMT detectors, 6 fps using the Airyscan detector in conventional mode, and 4 fps using the Airyscan detector in “superresolution” mode (assuming a 512 x 512 scan resolution and bidirectional scanning). Additional Multiplex and Sample Navigator software modules (purchased with matching institutional funds) permit up to an 8.75-fold increase in speed of sample acquisition in super-resolution mode, and convenient location and acquisition of multiple regions of interest within a large sample area. The system is controlled by ZEN 3.0 software which runs on a PC with a 64-bit Windows operating system and 192 GB RAM. The software includes the Multichannel, Z-stack, Time Series, Panorama, Measurement, Image Analysis, and Colocalization software modules, as well as automatic calibration of pinholes and scanners, and linear unmixing using manually defined or automatically-extracted reference spectra.