Detecting rare events by confocal microscopy in populations of live cells requires imaging in a macroscopic field of view of several millimeters in diameter. Standard laser scanning confocal microscopes (LSCM) or spinning disk systems are too slow for this purpose. Using the scripting capabilities of the driving software of our gen-3 high-speed optical-sectioning Programmable Array Microscope (iPAM, [1,2]; abstract of A. De Vries) we are able to seamlessly image regions on the order of 1 mm$^2$. The total field of view is subdivided into a regular array of tiles corresponding to the size of the field of view of the microscope which depends on the objective and the format of the camera. The array is typically of dimensions 30×30, at each position of which a z-stack of 10-30 images is recorded within a few seconds. The scripting facility of the PAM allows us to analyze the recorded images concurrently such that after an initial scan of the total area only those tiles are retained in which cells of interest have been detected. As a sample application, we present the recording of the optogenetic, UV-triggered protein transport from the endoplasmatic reticulum to the Golgi apparatus.
