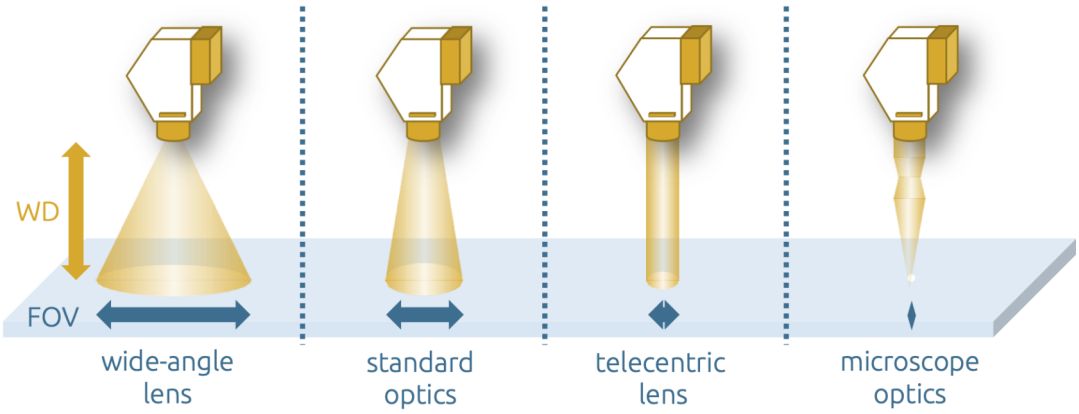
Spatial resolution and working distance

The optics/lenses of most HSI systems are variable, e.g. via the industry standard C-mount. This results in a wide range of configuration options, as illustrated in Fig. 3. The minimum working width of the HSI system is determined by the focal plane of the lens; in addition, the working distance (WD) can usually be freely selected. The resulting field of view (FOV) can therefore be set from a few millimetres (microscope) to several meters or kilometers.



Hyperspectral imaging: field of view in different optics configurations

The theoretical spatial resolution of the scan line (x-coordinate) can be determined directly from the field of view and the available number of pixels of the detector; in reality, the resolution is also significantly influenced by the quality of the holographic grid. The spatial resolution of the y-coordinate, on the other hand, depends on the measurement parameters selected later, such as the measurement frequency of the detector and the speed of the samples. Therefore, hyperspectral data can have square pixels, but depending on the recording mode, the pixels can also be compressed or stretched. The spectral resolution (z-coordinate) depends on the combination of holographic grating, detector and input slit and is documented on the manufacturer's data sheets or calibration. When planning inspection tasks using HSI, it should also be taken into account that not all wavelengths can be imaged sharply at the same time due to the optics. The focal plane is not only shifted along the z-axis, but also by the wavelengths.

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