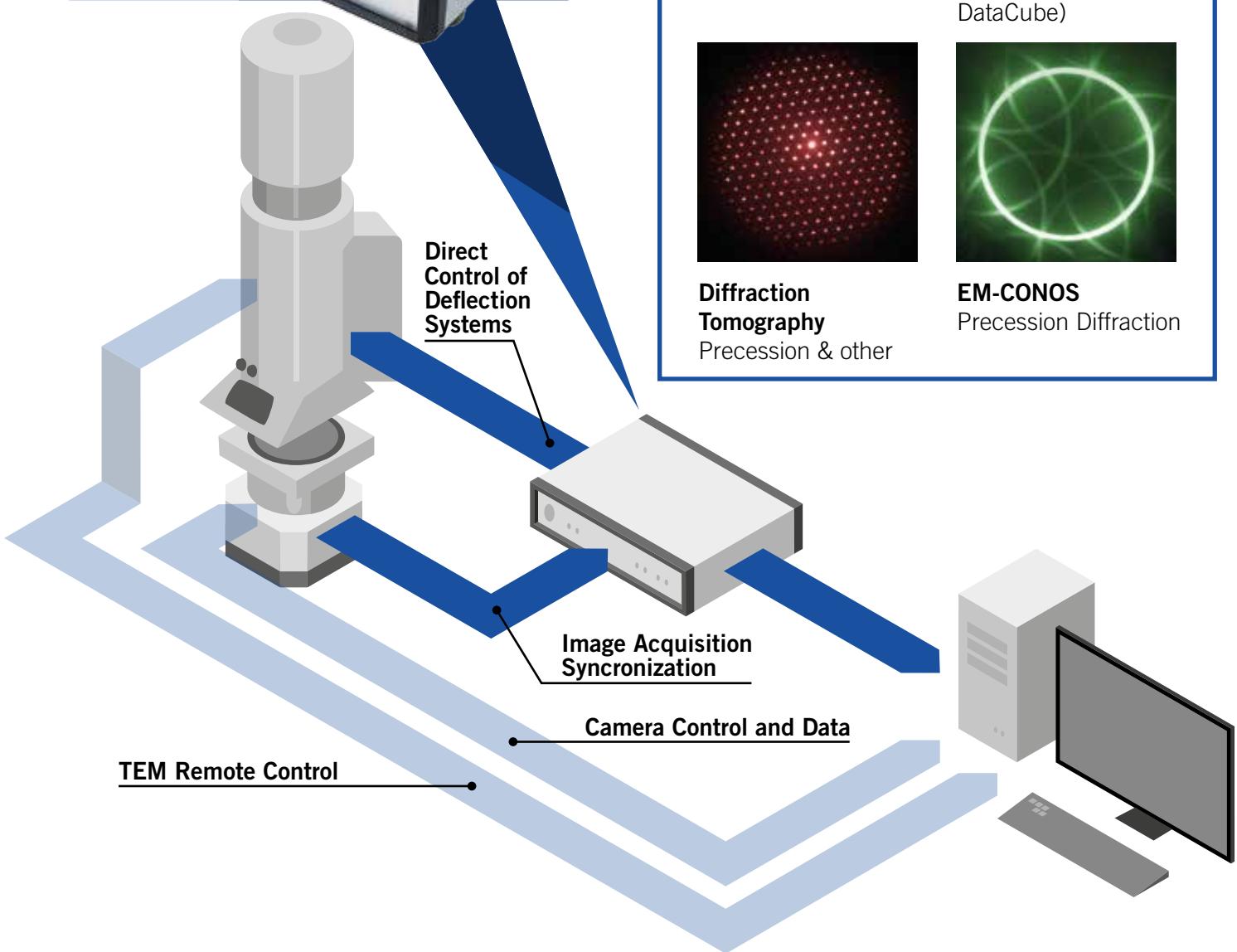


USG

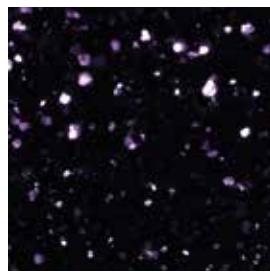
UNIVERSAL SCAN GENERATOR
WITH SYNCHRONIZED DATA
ACQUISITION



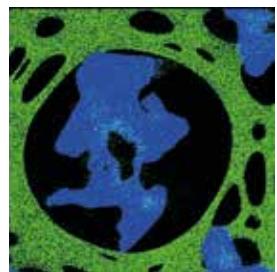
STEM Imaging
(BF, DF, HAADF)



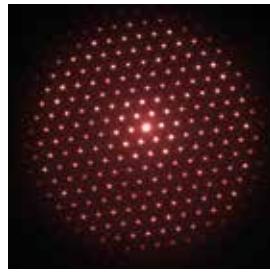
STEM Tomography
(BF, DF, HAADF)



Dark Field
3D Orientation Map



Spectroscopy
(EELS/EDX-3D-
DataCube)



Diffraction
Tomography
Precession & other



EM-CONOS
Precession Diffraction

USG – Real Time TEM Control for Multiple Applications

TVIPS has launched its newly developed [Universal Scan Generator \(USG\)](#) which allows to control up to eight TEM deflection coils or lenses with user-defined parameters directly in combination with synchronized image acquisition. The USG features 8 analog input/output channels (± 10 Volt, 16 bit) and 64 digital input/output channels.

Thanks to its universal design the [USG](#) device is suitable for multiple applications:



STEM

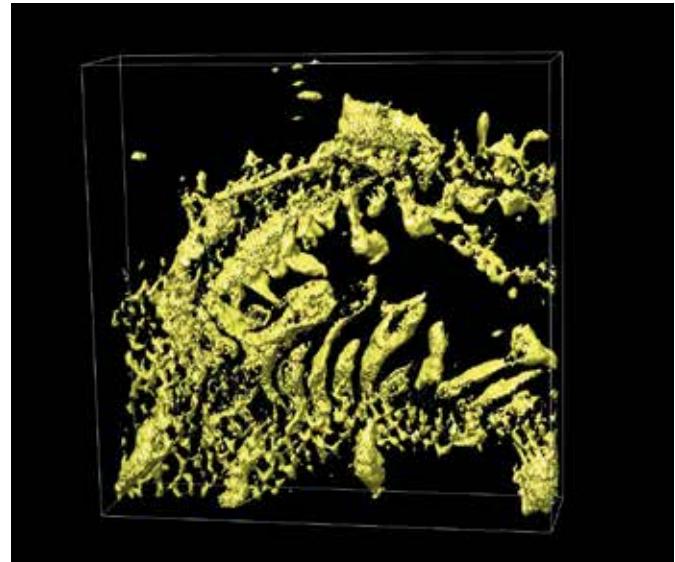
Most TEM types can be retro-fitted with the USG device. In case of a TEM without internal scan generator, beam and image shifts are performed by controlling the deflection coils directly (above and below the specimen)

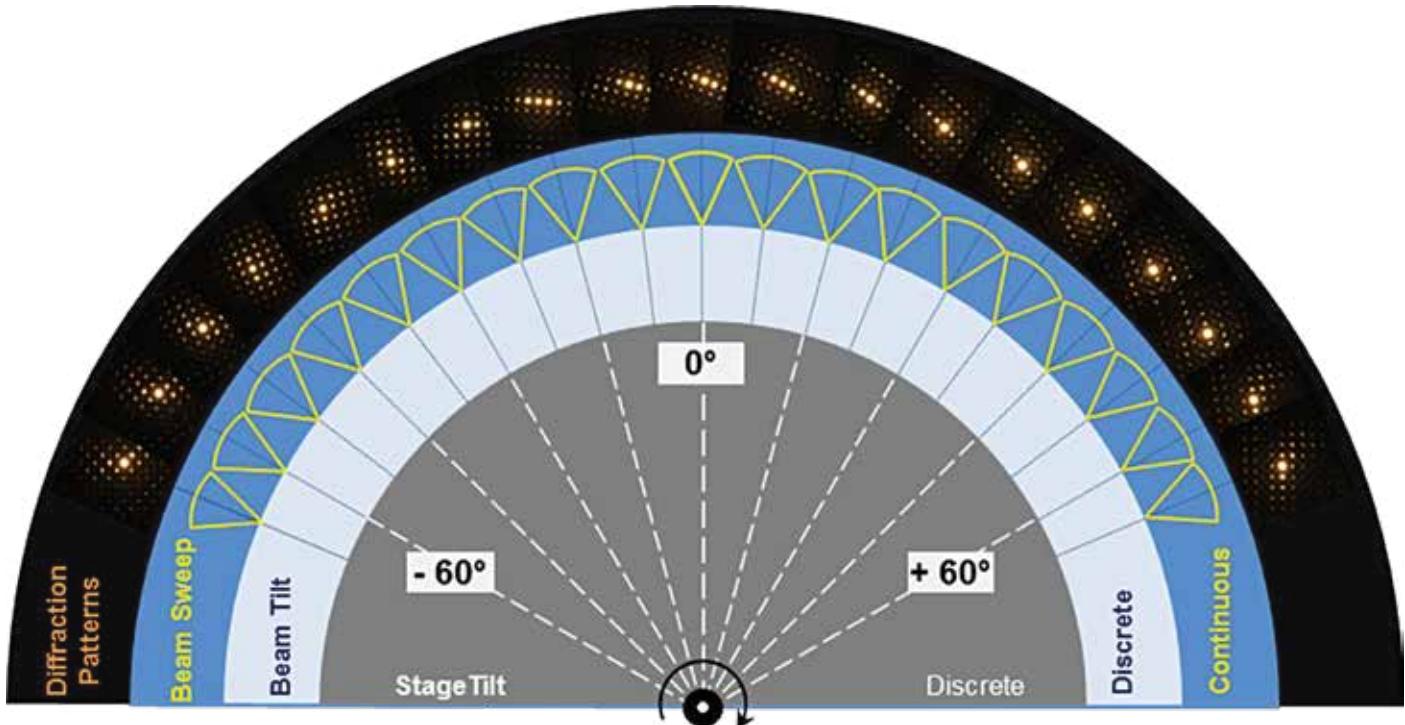
- Simultaneous acquisition of BF, DF, HAADF images (single or continuous mode)
- Up to $16k \times 16k$ pixels image sizes
- Recording of individual Ronchigrams
- Input for camera synchronization signal
- AC synchronization
- Powerful image acquisition and processing software



STEM Tomography

- Dynamic focusing
- Linear contrast: The Bragg contribution of crystalline specimen can be reduced
- Increased focal depth by means of nearly parallel illumination: Specimens up to 1 micron thickness can be studied (± 70 degree)
- Low dose tomography using a navigator tool
- Less radiation damage compared to conventional TEM





EM-CONOS

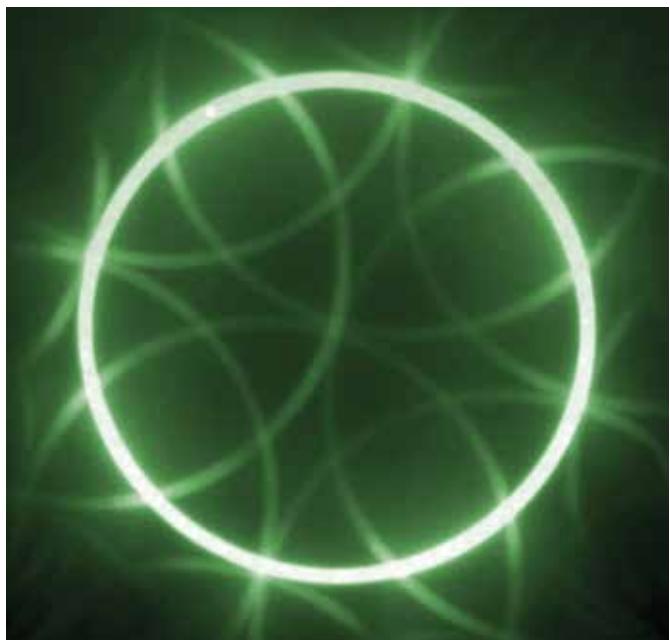
Precession Diffraction Tomography (S/TEM)

Automatic 3D Electron Diffraction Tomography (EDT) acquires full reciprocal data sets of single crystals under low dose condition such as organic or protein crystals (life sciences) and beam sensitive materials (material science). The combination of discrete stage tilt and discrete/continuous beam tilt (perpendicular to stage tilt axis) makes sure that diffraction reflexes of the whole reciprocal space of a crystal can be recorded using a minimum electron dose.

- A powerful acquisition and processing software for reconstruction
- Semi-automated calibration procedure

Example for data acquisition with a total electron dose of about $8 \text{ e}/\text{\AA}^2$:

Goniometer tilt range	$\pm 30^\circ$
Goniometer tilt increment	4°
Discrete beam tilt step	0.2°
Beam tilt sweeping range	0.2°
Exposure time	500 ms
Number of diffraction patterns	336
Dose per image	$0.024 \text{ e}/\text{\AA}^2$
Total acquisition time	8 min



This can be combined with precession diffraction:
Reducing the dynamical effects and increasing the number of reflexes.



TemCam-F416R is a 16 megapixel camera for JEOL TEMs, covering an image area of $64 \times 64 \text{ mm}^2$. Beyond doubt, this camera, with its unique combination of high sensitivity, exceptional acquisition speed and dynamic range, will replace classical 4k slow scan CCD cameras in the future.

TemCam-F416R

Sensor Type	CMOS	Frame Rate @ full Frame Rate reduced	1.0 fps 8.5 fps @ 4k x 1k
Sensor Size in Pixel	4096 x 4096	Dynamic Range (max/noise)	10 000 : 1
Pixel Size (μm^2)	15.6 x 15.6	Signal/noise ratio of a single 200 kV electron	12 : 1
Field of View (mm^2)	64 x 64	Resolution @ 200 kV NTF @ Nyquist	~19 %
Read out Rate @ Digitalization	4 x 10 MP/s @ 16 bit	Mounting Position	on axis, retractable
