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REVOLON

free, fast, flexible - TEM Scan Controller
with open access and Python sample code

point electronic

point electronic

New standard in STEM control

The REVOLON TEM Scan Controller defines new benchmarks with open access, high-performance functions, free scan patterns and compatibility with all major TEM models.

free microscopy

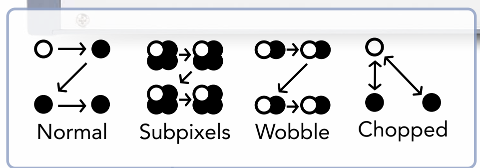
Unrestricted beam access with Python code

fast scanning

Highest speed for in-situ STEM

flexible control

Best 4D STEM synchronization



Extended analog inputs

Simultaneous acquisition of up to 16 signals with a maximum speed of 200 ns/pixel

Advanced image scans

Built-in scan generator and image acquisition modes

Gapless frames

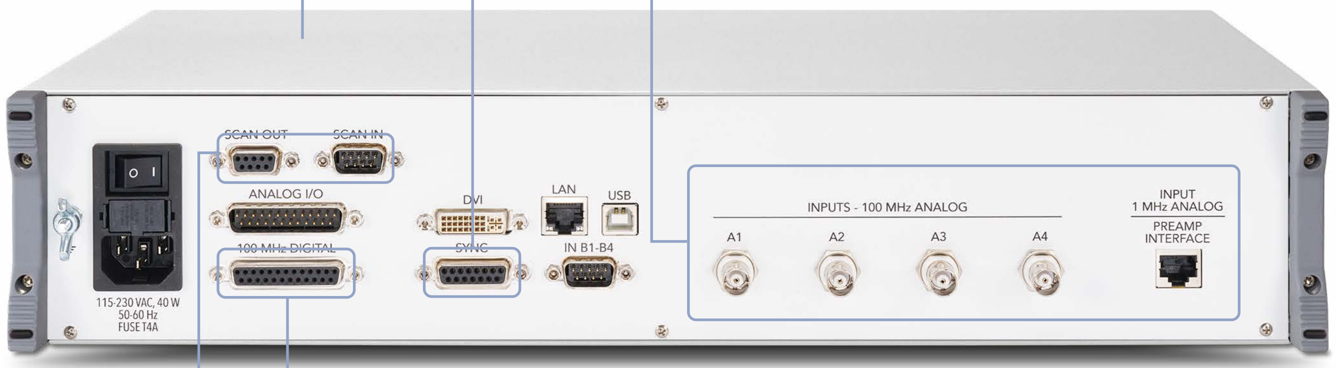
Time lapse acquisition of multiple frames without any gap, for in-situ microscopy

Camera synchronization

Adjustable TTL trigger inputs and outputs for 4D STEM cameras

Ultra-fast analog inputs

Shortest pixel acquisition time for TEM scanning with 10 ns/pixel



Digital pulse signals

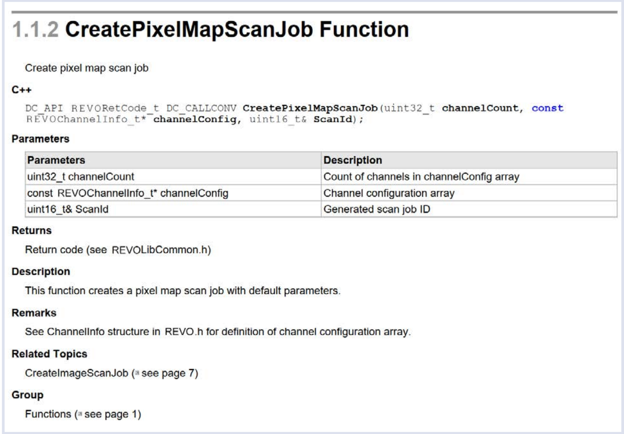
Inputs for pulse processors with single electron counting

Broad TEM compatibility

Connection via TEM's external scan interface, automatic scan switch included

To the cutting edge

Use point electronic Scan Control Software
or develop own application



1.1.2 CreatePixelMapScanJob Function

Create pixel map scan job

C++

```
DC_API REVORetCode_t DC_CALLCONV CreatePixelMapScanJob(uint32_t channelCount, const
REVOChannelInfo_t* channelConfig, uint16_t& ScanId);
```

Parameters

Parameters	Description
uint32_t channelCount	Count of channels in channelConfig array
const REVOChannelInfo_t* channelConfig	Channel configuration array
uint16_t& ScanId	Generated scan job ID

Returns

Return code (see REVOLibCommon.h)

Description

This function creates a pixel map scan job with default parameters.

Remarks

See ChannelInfo structure in REVO.h for definition of channel configuration array.

Related Topics

CreateImageScanJob (see page 7)

Group

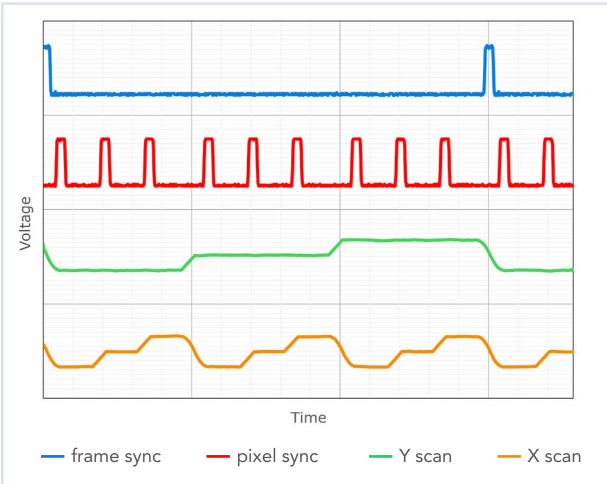
Functions (see page 1)

SDK for open device control

- Software Development toolKit (SDK) for complete configuration
- DLL control library for Windows and Linux
- Python sample code for independent coding

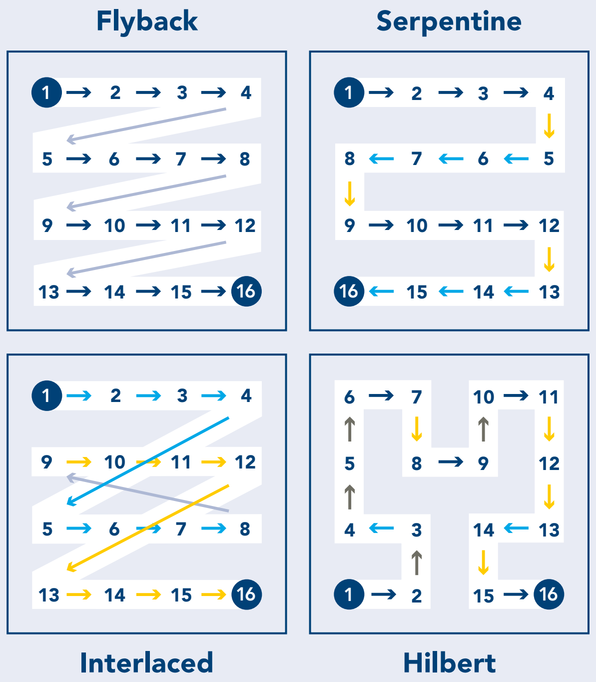
4D STEM synchronization

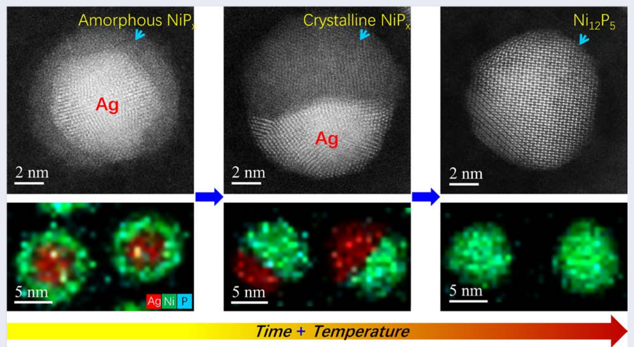
- Gain direct and unrestricted access to beam timing
- Freely configure frame/line/pixel scan triggers for camera synchronization
- Combine with advanced subpixel, chopped or wobble scan modes



Advanced pixel maps

- Prepare a list of coordinates
- Upload to the scan controller
- Run and download digitized values
- Make an image, display and repeat

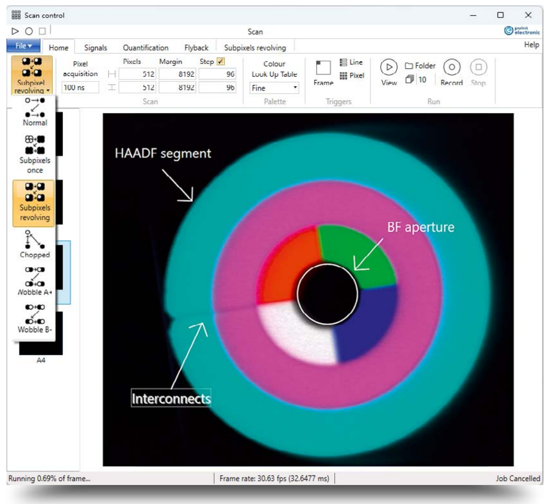




X Huang et al, ACS Nano, DOI:10.1021/acsnano.8b03106

Highest speed for in-situ STEM

- Speed up in-situ experiments with gapless frames
- Improve temporal resolution with fastest analog and digital inputs
- Optimize frame rate with full access to flyback parameters



Function highlights

- Additional digital 16-bit magnification, 10-bit scan shift and 360° scan rotation
- Built-in 1…50,000 kHz clock generator, with free running or synchronized scans
- Advanced 20-bit digital lock-in amplification on the 1 MHz analog input
- Optional GHz digital inputs with adjustable thresholds for ultrafast electron counting

REVOLON TEM Scan Controller

Control & data	LAN or USB2
Signal inputs	4× **12-bit 100 MHz analog** (A1…A4)
	4× **12-bit 100 MHz analog** (B1…B4) (B is not simultaneous with A)
	4×, 8x or 16x **12-bit 5 MHz MICS amplified analog** (M1…M16)
	12× **16-bit or 6x 32-bit TTL 100 MHz digital** (D1…D12)
	1× **20-bit 1 MHz analog** (L1, see Preamp interface)
Scan outputs	±2.2V…±7.5 or ±0.65…±2.2V **balanced X, Y scan signals** (SCAN OUT)
	±3.5…±12 V X, Y scan signals (ANALOG I/O)
	Gnd., 5V or 15 V external bank/scan (ANALOG I/O)
	Automatic scan switch for daisy-chain (SCAN IN and ANALOG I/O)
Synchronization	**3× TTL scan Frame, Line and Pixel inputs**
	1× TTL scan Pause/Resume input
	3× TTL scan Frame, Line and Pixel outputs
	1× TTL Device Clock output
	1× TTL Beam Blanker output
Scan generator	**10 ns … 10 s pixel acquisition time** (10 ns steps)
	10 ns … 10 s pixel set and hold times (enumerated list)
	1…65,635 pixels width and height
	0…360° digital scan rotation
	0…256× frame average
	0…50× line average
	0…255 frame count
	Mains frequency synchronization
Image scan modes	Normal (sawtooth, flyback)
	Sub-pixel (one or revolving)
	Chopped
	Wobble (A+, B-)
Pixel maps	**16 MPixel pixel list size** (4k x 4k image scan equivalent)
	Individual set and hold times per pixel
	Individual Pixel, Line and Frame triggers per pixel
Adjustments & amplification	-1.25...1.25 V 16-bit signal offset (A1…A4 or B1…B4)
	-22...26 dB signal gain (A1…A4 or B1…B4)
	-1…1 V 16-bit MICS signal input offset (M1…M16)
	1…1,800× MICS signal gain (M1….M16)
	-1…1 V 16-bit MICS signal output offset (M1…M16)
	3.4 MHz…34 Hz MICS low-pass filter (M1…M16)
	-2…2 V 10-bit scan offset (SCAN OUT and ANALOG I/O)
	3.5...12× scan gain (SCAN OUT and ANALOG I/O)
	-2…2 V 16-bit scan shift (ANALOG I/O)
	0…65,635× scan shift and magnification (ANALOG I/O)

Preamp interface	1...4,095 digital gain
	1...50,000 kHz TTL clock output
	Free, Pixel, Line and Frame clock modes
Ultrahigh speed electron counting (optional)	2× **16-bit 1 GHz analog** (ECL1…ECL2)
	2× threshold level outputs
Touch display	Scan status overview
	Installed options list
	Scan detailed information
	LAN connection settings
Housing	19-inch rack-mountable

Parts and cables

REVOLON Scan Controller unit	Standard 1×
TEM scan cables	Standard 2× SCAN OUT (for TFS and JEOL external scan interfaces)
	Standard 2× SCAN IN (for TFS and JEOL external scan interfaces)
Signal cable	Standard 4× VIDEO IN (for 100 MHz analog inputs, A1…A4)
Mains power cable	Standard 1×
USB flash drive	Standard 1×

Software packages

Driver	PE USB for Windows
Software Development Toolkit (SDK)	**Windows and Linux control libraries**
	Library API documentation
	Python sample code
Software	Scan Control
	Microscope Data

Weight and dimensions

REVOLON TEM scan controller unit	typ. 30 × 9.2 × 48.1 cm, typ. 4 kg
Shipping	typ. 36 × 32 × 60 cm, typ. 5 kg

Site requirements

Power	1× mains 105/240 VAC single phase 50/60 Hz
	On the same Gnd. as the microscope
TEM connections	**1× external scan interface** (daisy-chain configuration supported)
	1× minimum video signal outputs
Space	Controller should be placed in a TEM rack
PC / Laptop	Intel Core i3 minimum
	1× minimum USB 2.0
	Network is recommended for remote support
Display	1,280 × 1,024 minimum resolution

Our design principles

We look back on over 30 years of experience in development and manufacture of high-performance instruments and technologies for microscopy.

We are driven by an ambition to expand abilities and to improve performance of electron microscopes.

Our aspiration is to make the best quality tools and to join our customers on their journeys of scientific exploration and discovery.

Performance
Microscopy must be a reliable and enjoyable experience
- Design for highest speed and resolution at the lowest noise
- Develop smart independent controllers for live optimization
- Support new users with intuitive and automated controls
- Assist advanced users with access to all parameters

Efficiency
Microscopes must provide an uninterrupted focus
- Use standard microscope controls and data formats
- Give instant feedback with live image mixing and processing
- Add bespoke software tools and algorithms for repetitive tasks
- Support developers with open access libraries and documentation

Environment
Products and technologies must be sustainable
- Reduce power consumption through smart design
- Minimize material use, embrace reuse where possible
- Save weight and volume for shipping and maintenance
- Enable everyone to develop sustainable innovations

Quantification
Data and control must be in physical units
- Provide calibrated inputs and outputs for quantitative measurements
- Supply samples, procedures, and software for calibration
- Distribute all control parameters in device independent values
- Empower the user to operate the SEM as a measuring device

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