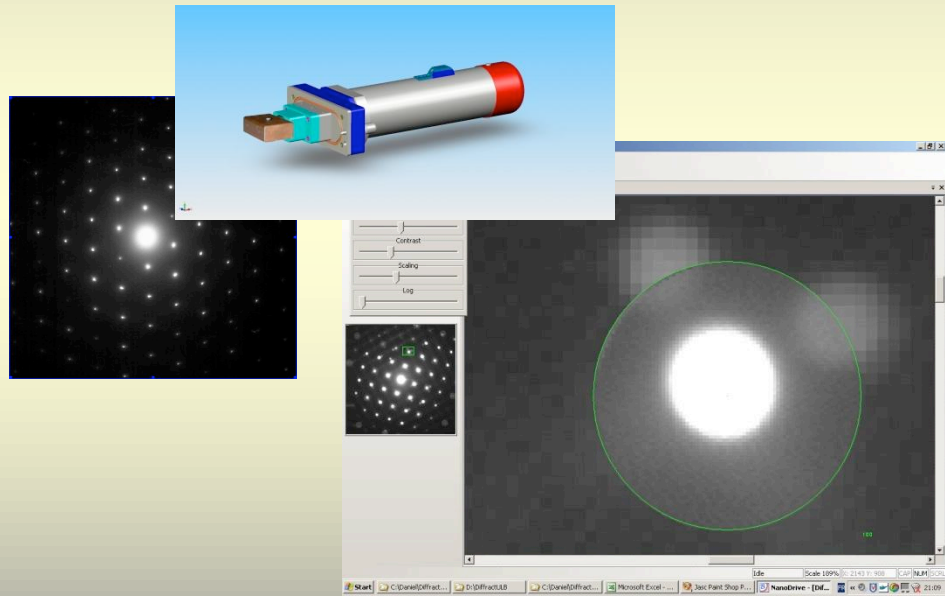
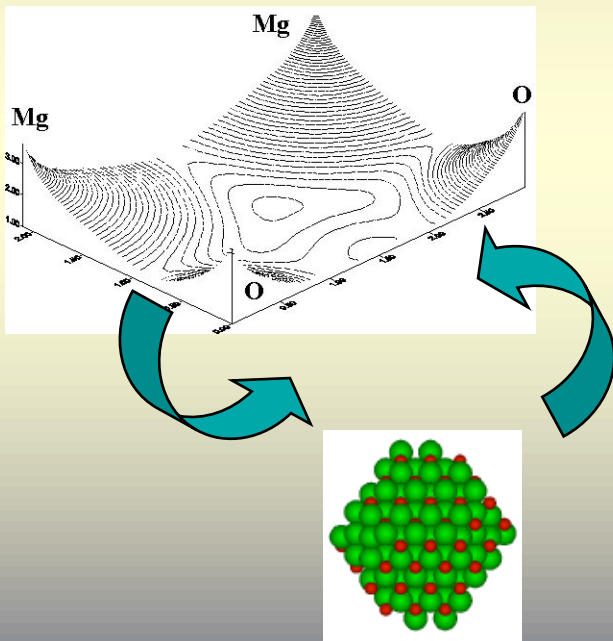
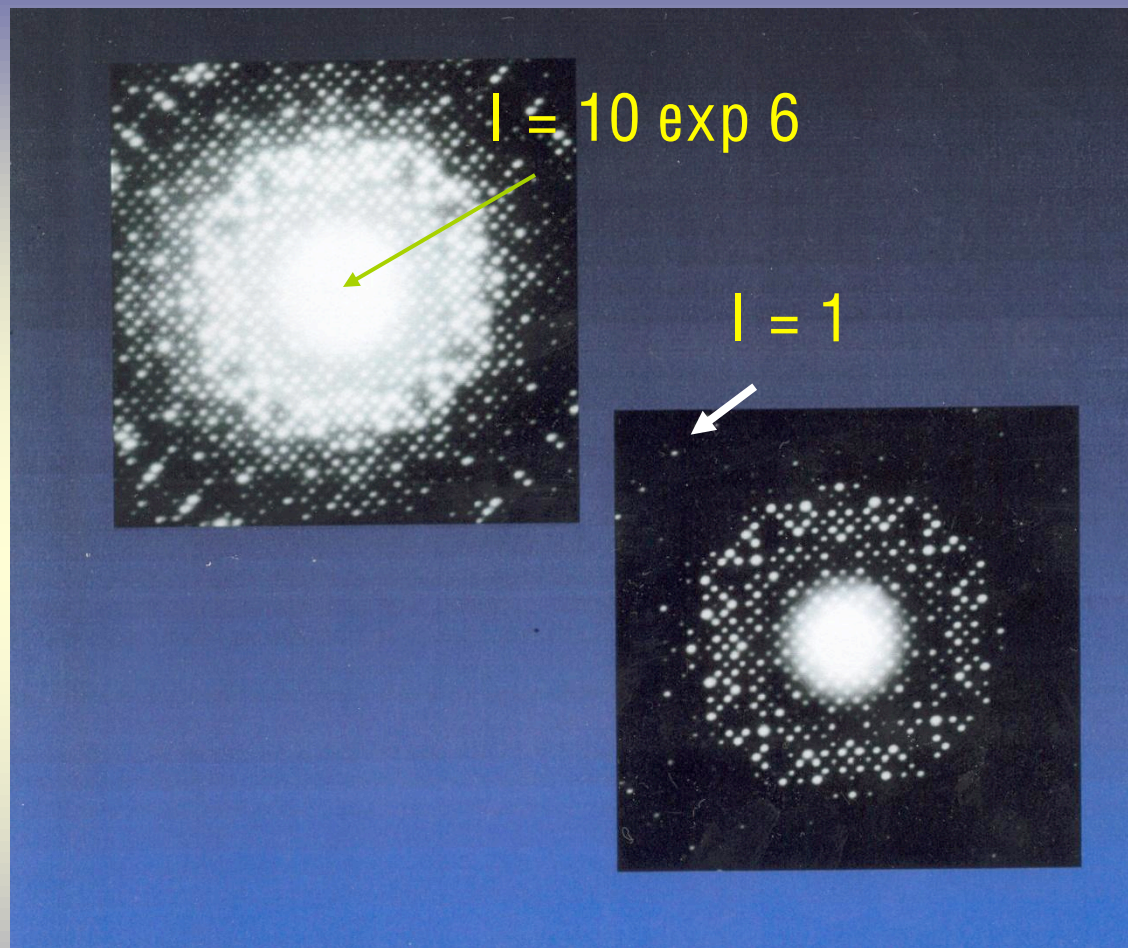


# Electron Diffractometer

.... The link between atomic structure and physical properties



# MEASURING ED INTENSITIES : $> 10^6$ DYNAMIC RANGE

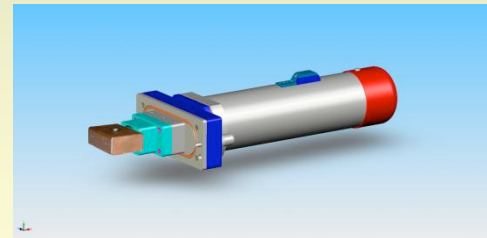
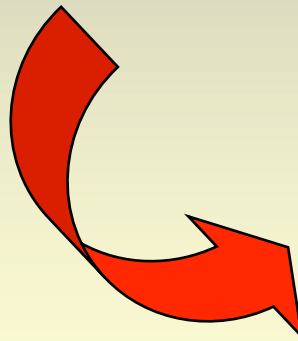


LIKE IN X - RAY CRYSTALLOGRAPHY FOR ELECTRON DIFFRACTION  
STRUCTURE DETERMINATION ALL REFLECTIONS MUST BE MEASURED  
WITH HIGH PRECISION

# How measure *electron diffraction intensities* ?



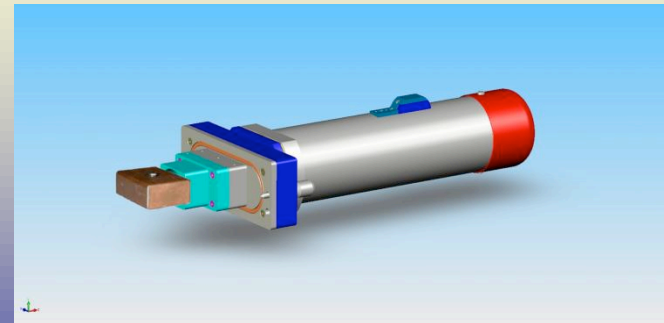
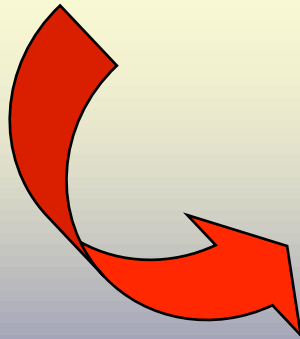
NEW dedicated electron diffractometer for PRECISE  
and reliable collection of electron diffraction intensities



# How measure electron diffraction intensities ?

ED pattern is scanned pixel by pixel with a dedicated unit through a specially designed point ultra-sensitive detector

System able to detect 24 bit intensity (16.000.000 grey levels) linearly and without saturation.



**NanoMEGAS**

Advanced Tools for electron diffraction

# VARIABLE RESOLUTION SCANNING STEPS

MAXIMUM DIFFRACTION PATTERN RESOLUTION 4k x 4k

The screenshot shows the NanoDrive software interface. The main window displays a diffraction pattern with a green circle labeled "2k x 2k resolution" and a red arrow pointing to a larger area labeled "512 x 512 resolution". A "View Preferences" panel is on the left, and a taskbar at the bottom shows NanoMEGAS logo and "Advanced Tools for electron diffraction".

**512 x 512 resolution**

**2k x 2k resolution**

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# MEASURE TRUE ELECTRON DIFFRACTION INTENSITY

The screenshot displays the NanoDrive software interface with the following elements:

- View Area:** Shows a diffraction pattern with a central bright spot and surrounding spots. A green circle highlights a region of the pattern.
- View Preferences:** A panel on the left with sliders for Brightness, Contrast, Scaling, and Log.
- Intensity Scan:** A diagram of a blue hourglass shape with a white arrow pointing towards the diffraction pattern, labeled "intensity scan combining precession".
- No Intensity Saturation:** A large white arrow pointing from the intensity scan towards the diffraction pattern, labeled "no intensity saturation".
- True Average Intensity:** A large white arrow pointing from the diffraction pattern towards the text "true average intensity from special electrometer Faraday cage".
- Taskbar:** Shows the Windows taskbar with the NanoDrive window active, along with other open applications like Microsoft Excel and Jasc Paint Shop Pro.
- System Tray:** Shows the system tray with the date and time (21:09).

# ULTRA- HIGH DYNAMIC RANGE 24 BIT = 16.777.216 grey levels AT ONE SHOT

The screenshot displays the NanoDrive software interface for a diffraction pattern analysis. The main window shows a diffraction pattern with a green overlay on the right side. The text "NO INTENSITY SATURATION !" is prominently displayed in white on the green background. Three white arrows point to specific features in the pattern, labeled with values: 46.028, 16.361.152 grey levels, and 51.195. The software's settings panel on the left includes sliders for Brightness, Contrast, Scaling, and Log, and a table of parameters.

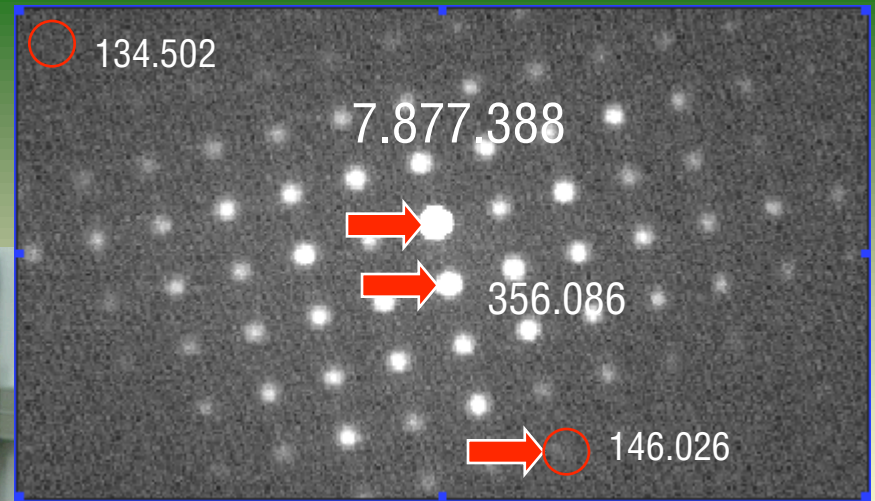
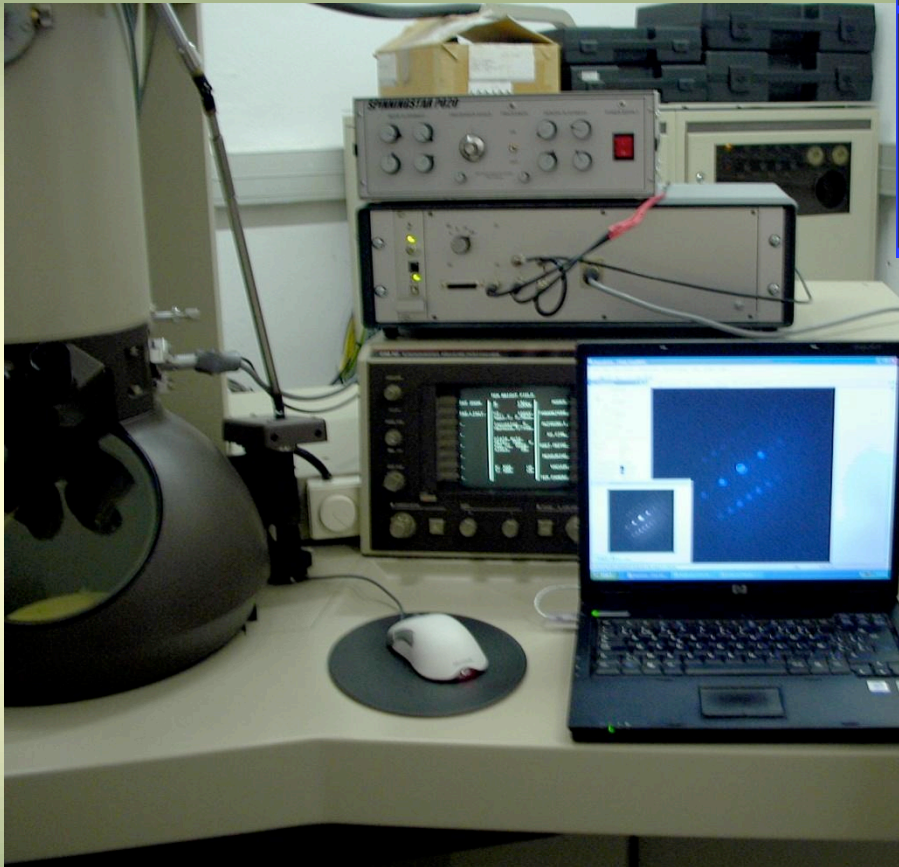
Brightness	-38
Contrast	14545
Scale	12
Log	1
Undefined point...	008000
Invalid points color	c0c0c0
Selected points ...	c0c0c0
Reflections font	Arial(6)

Output

Performing POINT INTENSITY analysis with radius 10: 16640262

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# Comparison CCD – Electron diffractometer



Electron diffractometer 24 bit  
16.000.000 grey levels

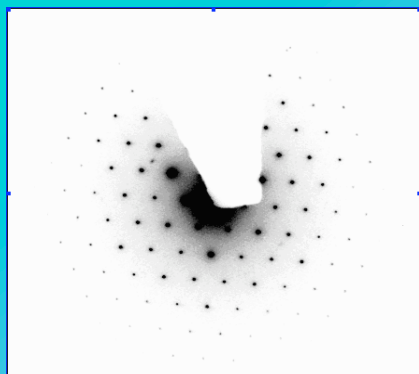


CCD 12 bit 4096 grey levels

# COMPARISON CCD camera – Electron diffractometer Pleiades

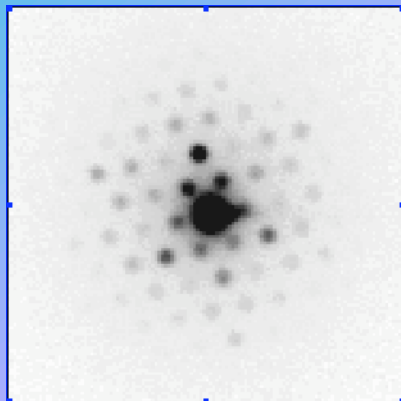
example :  $\text{Ca}_{12}\text{Al}_{14}\text{O}_{33}$  [1 1 1] mayenite cubic garnet  $a=1.198$  nm

12 bit ( 4096 grey levels) CCD camera ----- 24 bit ( 16.000.000 grey levels) electron diffractometer

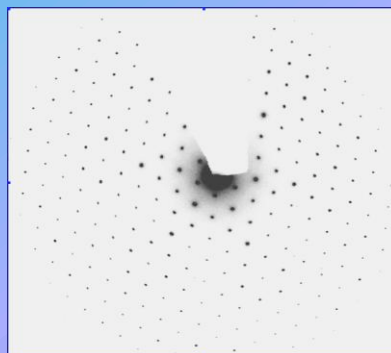


$R_{\text{merge}}$   
kinemat -SAED = 54 %  
 $R_{\text{merge,internal}}$  = 34.8%

**NO** Precession

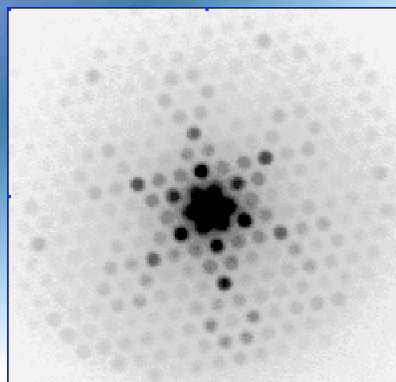


$R_{\text{merge}}$   
kinemat -SAED = 44%  
 $R_{\text{merge,internal}}$  = 32.3%



$R_{\text{merge}}$   
kinemat-precession = 29.5%  
 $R_{\text{merge}}$  internal = 23.9%

**Precession**



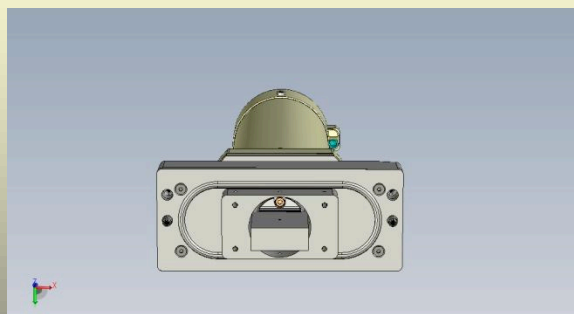
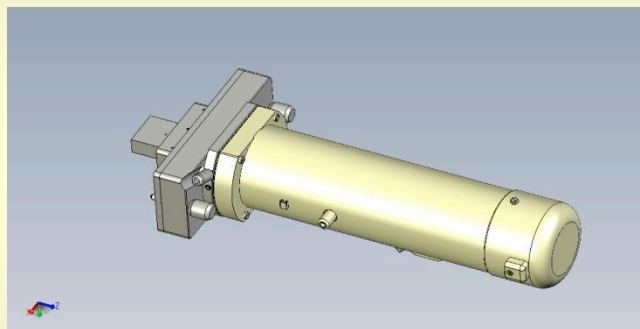
$R_{\text{merge}}$   
kinemat-precises = 21%  
 $R_{\text{merge,internal}}$  = 14.7%



Modular design 35 mm port DETECTOR housing

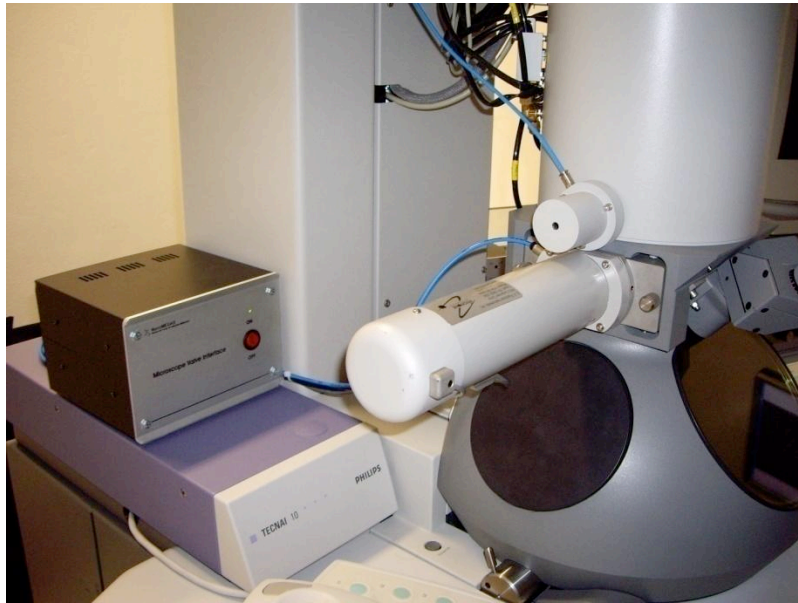
by Fischione Inc

**compatible with 35 mm port HAADF detector  
FEI , Jeol ...**



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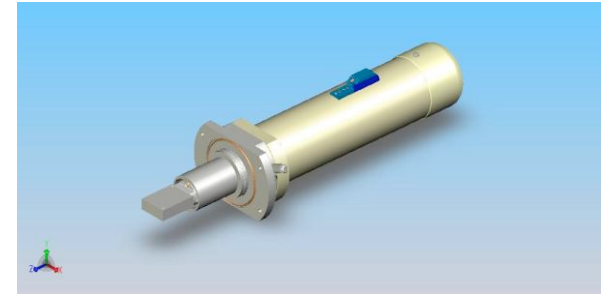
« Spinning Star » + Electron diffractometer  
+ Fischione interface installed at

**EM400, CM12, Tecnai 10**



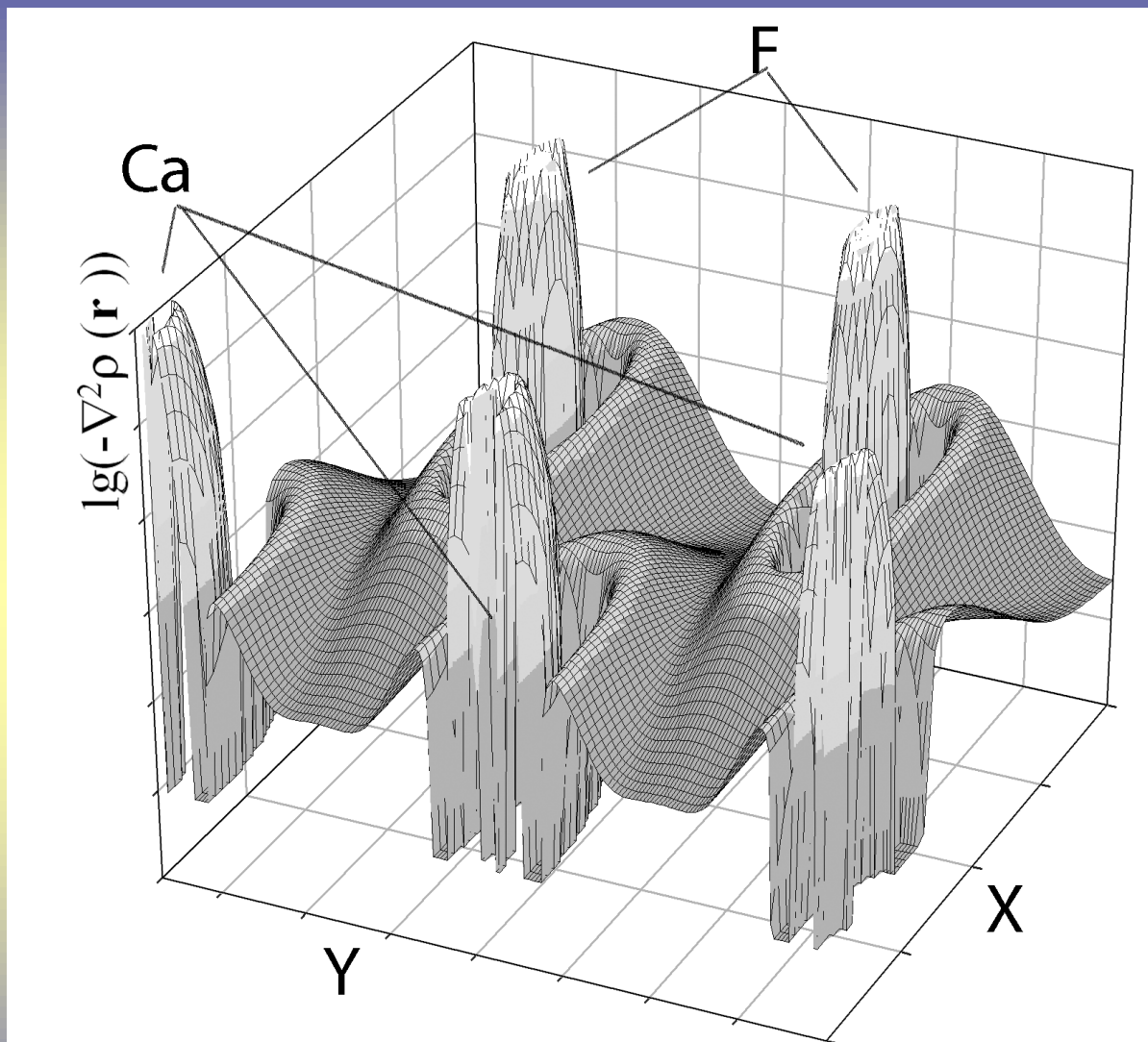
small box with on/off switch  
to insert Megaview CCD camera





**« Spinning Star » + Electron diffractometer  
+ Fischione interface installed at  
JEOL 2100, JEOL 2010 , JEOL 2000**

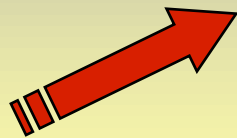
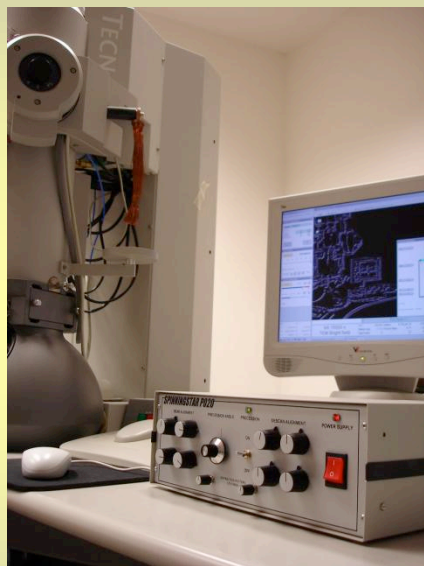




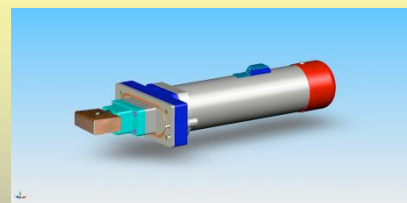
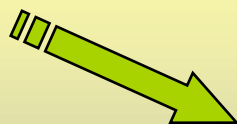
Laplacian electron density distribution  $-\nabla^2\rho(\mathbf{r})$  along (110) plane of  $\text{CaF}_2$

# NEW tools for your TEM...

TEM



PRECESSION UNIT



ELECTRON  
DIFFRACTOMETER

EDS

EELS

STEM

CCD

HAADF



**NanoMEGAS**  
Advanced Tools for electron diffraction