



MRSEC

Yale/SCSU's Center for research on Interface Structures and Phenomena, CRISP has been awarded a grant as a NSF Material research science and engineering center (MRSEC).

This MRSEC provides common facilities for microscopy, nanofabrication, and characterization. We currently have over 200 users, most from Yale.

Instrumentation includes...

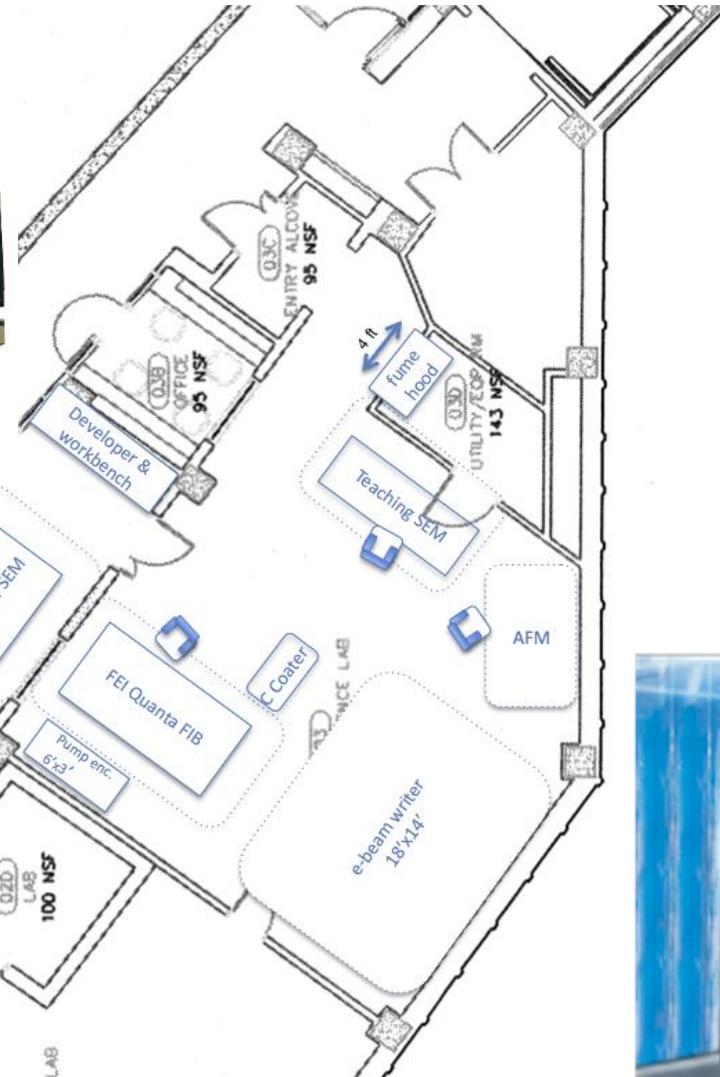
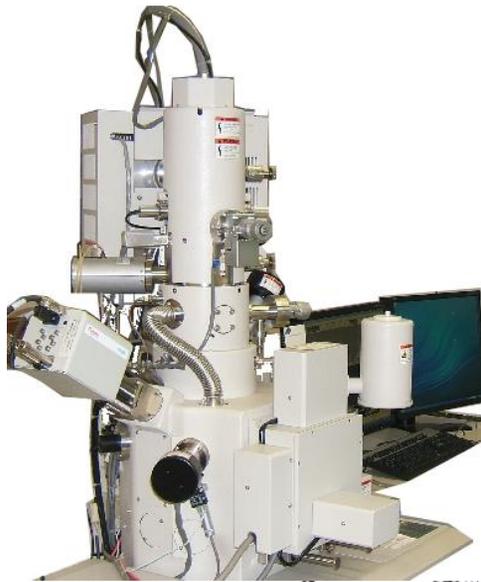
- SEM (Hitachi SU70)
- FIB (FEI Quanta 3D)
- E-beam lithography (Vistec EBPG)
- TEM (FEI Osirus)
- Two standard AFMs and one Liquid AFM
- XPS-ESCA
- SQUID magnetometer
- Low-temperature physical property measurement system
- X-ray diffraction
- Electrical testers, (C-V, I-V)
- Ferroelectric testers

Additional equipment will be available as a service:

- Molecular beam epitaxy for metal oxides
- Combinatorial sputtering for metallic glasses
- Ultra-high vacuum atomic resolution AFM & STM

CRISP

Yale Center for Research on Interface Structures and Phenomena



Malone Engineering Center

External ethernet

Linux server

Windows service
computer

Windows XP

SEM

TEM

internal

Linux

e-beam

Windows NT

AFM-1

Windows XP

AFM-2

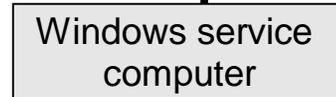
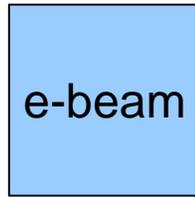
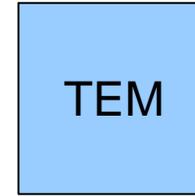
Windows XP

FIB

Internal ethernet
192.168.100.n

Firewall computers have two ethernet ports – one looking inward and one attached to the outside.

There is no automated port forwarding, and so one needs an account on the firewall computer to reach in.



Internet

Linux server

Vistec Inc

`putty.exe ebeam.yale.edu -X -l vistec -pw secret! -L 12345:localhost:12345`

`ssh -X foo@ebpg -L12345:192.168.1.314:12345`

e-beam

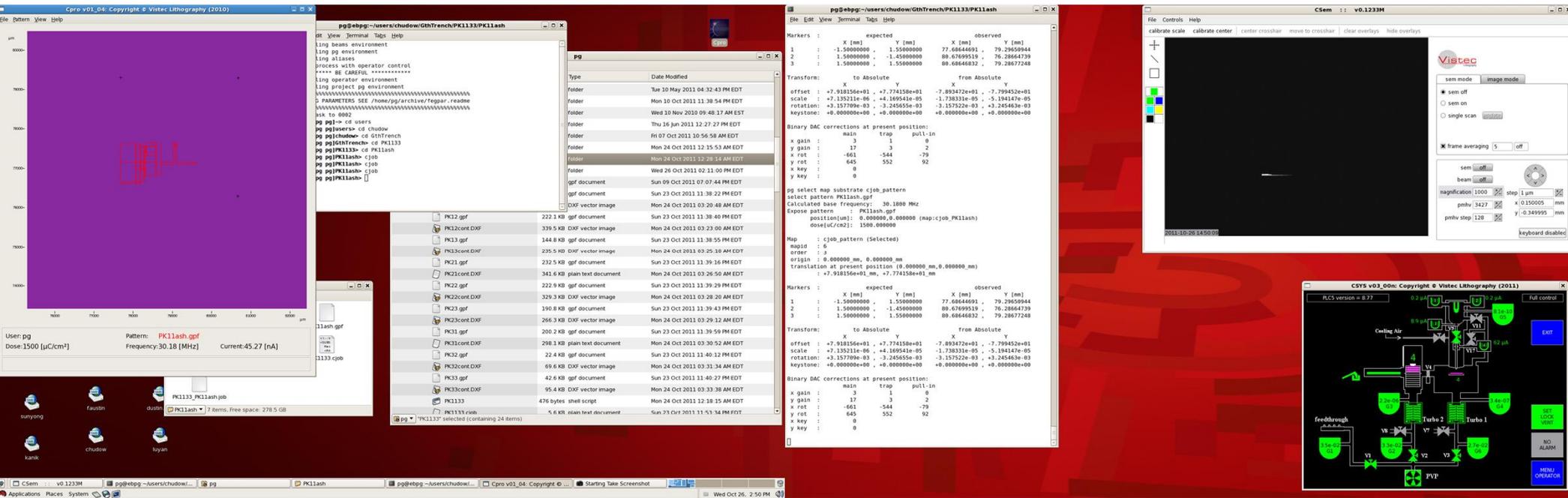
Back on the Vistec PC, start using the tunnel by opening a connection to 127.0.0.1 using the Hewlett-Packard RGS Client Receiver.

RGS is a commercial alternative to VNC, and is more reliable.

Creating a tunnel into a protected local network

Internal ethernet
192.168.1.n

Vistec remote access to e-beam writer



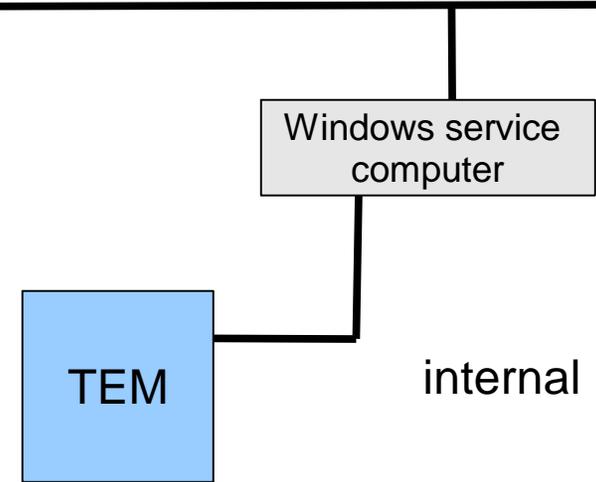
All functions are available, including video. This has been VERY useful for service and software updates, often from the Netherlands or Albany.

There are no hardware knobs, and so remote control is identical to local control.

Remote diagnostics can use a built-in voltmeter and matrix switch.

BUT students are not allowed remote access, because of the likelihood of interference.

External ethernet



FEI uses their own Windows-based remote access system called "Rapid".

They set up a VPN connection to a dedicated service computer, which is dual ported to the TEM control system.

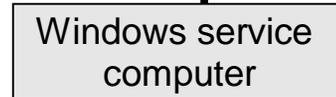
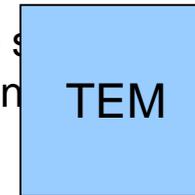
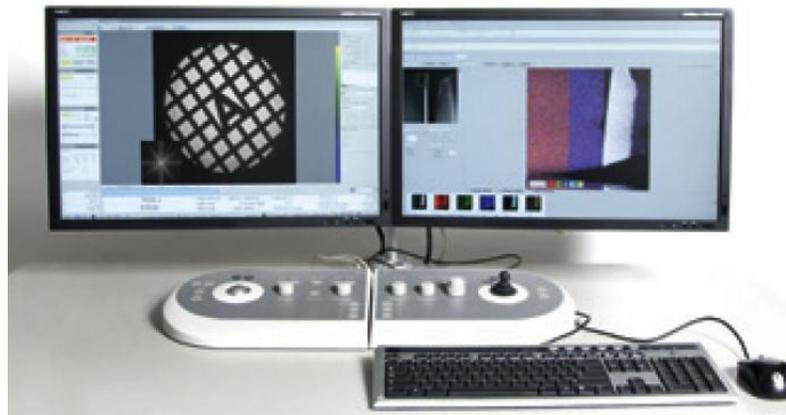
External ethernet

Knobs and buttons are not available to remote service people, and so remote operation is awkward and clumsy at best.

Most problems are hardware related, and so remote access is not especially useful for service.

Remote access IS useful when FEI is trying to help customers; e.g. showing how to access obscure software functions.

The cost for a remote-control knob set is prohibitive just for occasional classroom demonstrations.



internal

