

Choosing a microscope

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The questions:

- What do you need?
- How many people does each microscope serve?
- How do you validate your instrument performance?
- How do you schedule time to optimize the instrument usage and performance?

Context

The University of Toronto:

67128 Undergraduate

15884 Graduates

12589 Faculty

The Hospital for Sick Children Research Institute:

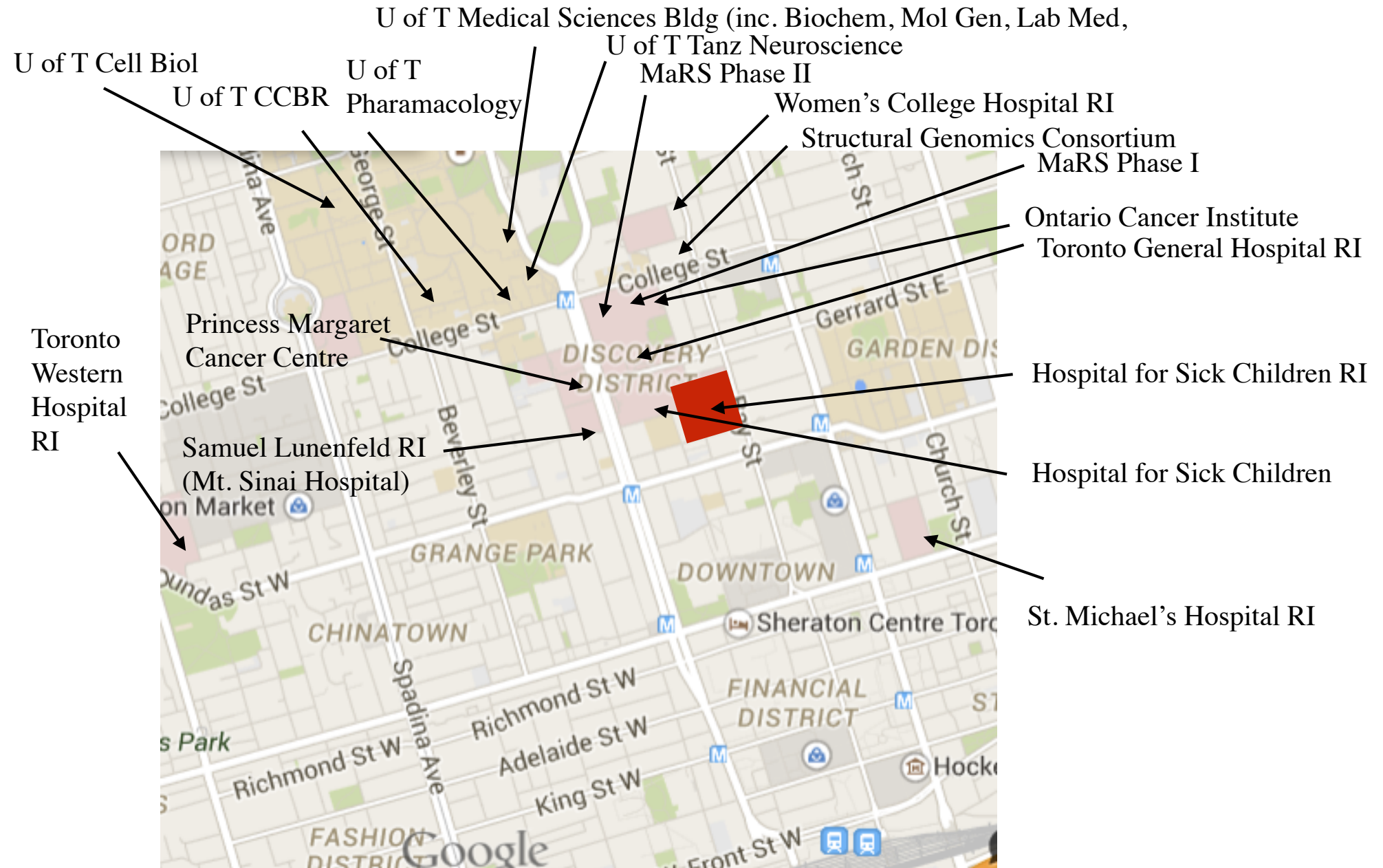
239 PIs (>50% Research Time)

313 PIs (<50% Research Time)

225 PDFs

449 Graduate students

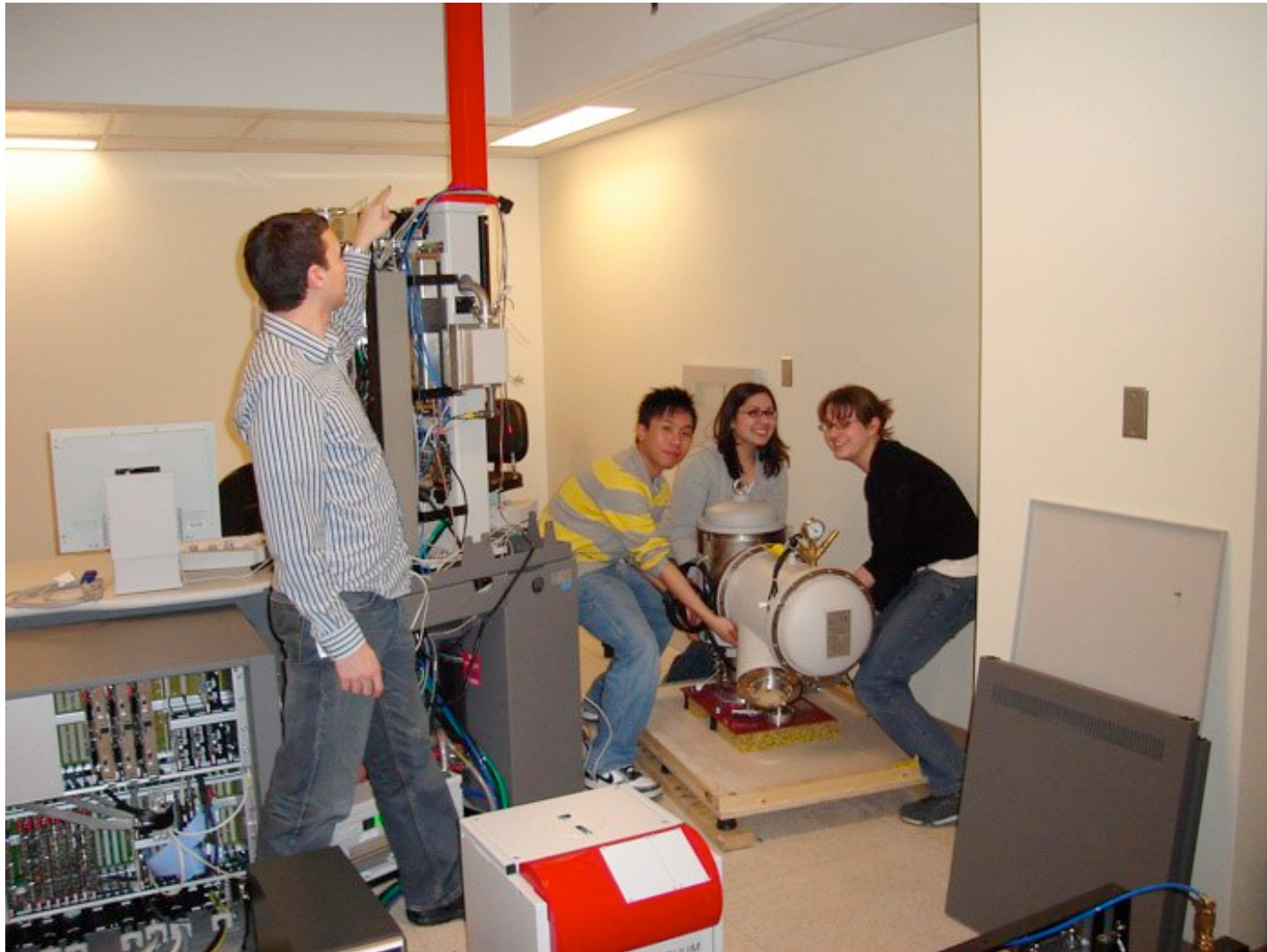
Geographic factors



New PI: Do not set up a multi-user facility
Choose your collaborations carefully

Decision: 1 Group. 1 Microscope.

Microscope Installation



February 2007

Microscope Installation



February 2007

Current equipment

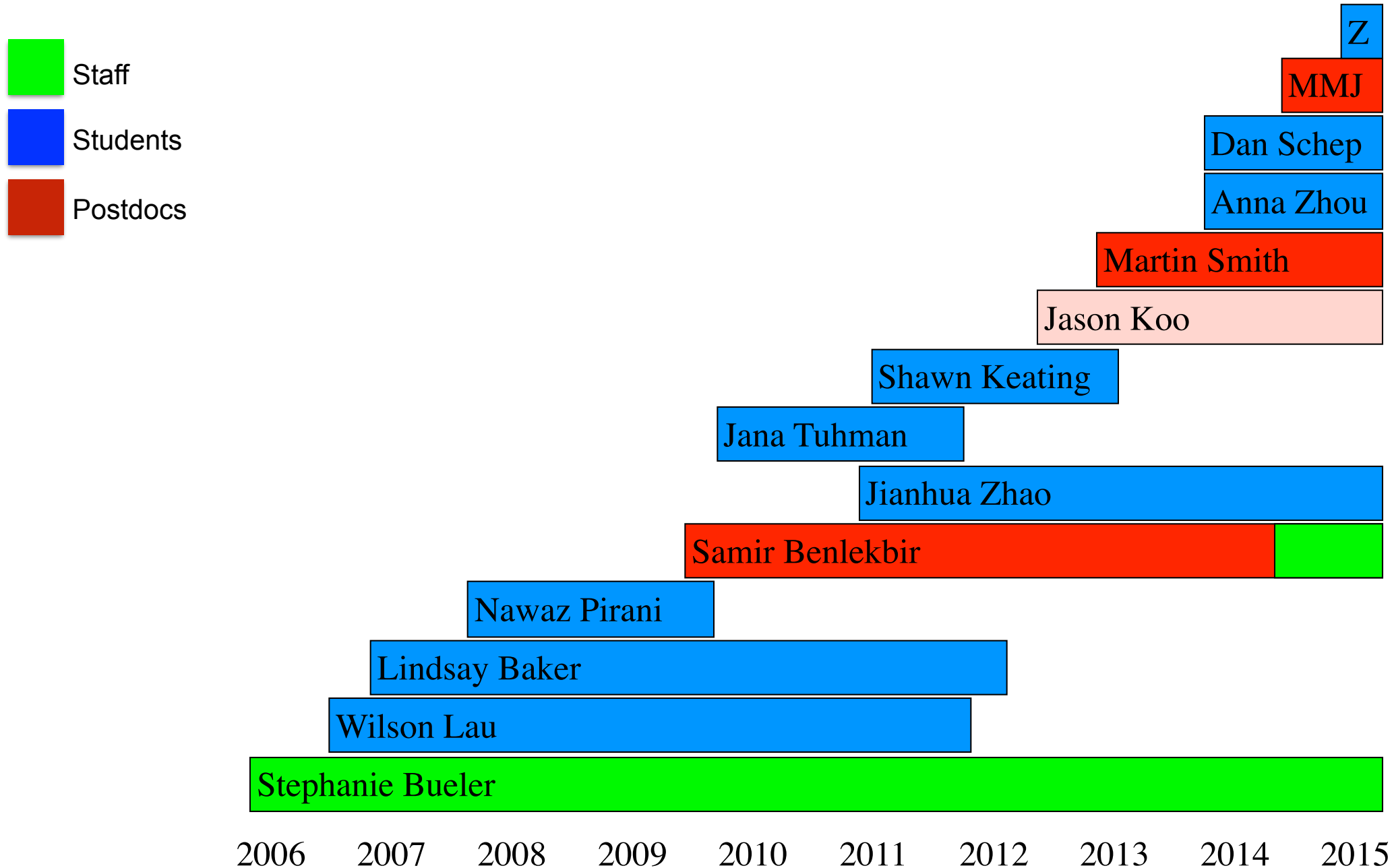


Tecnai TF20
Installed February 2007



Gatan K2 Summit
Installed June 2013

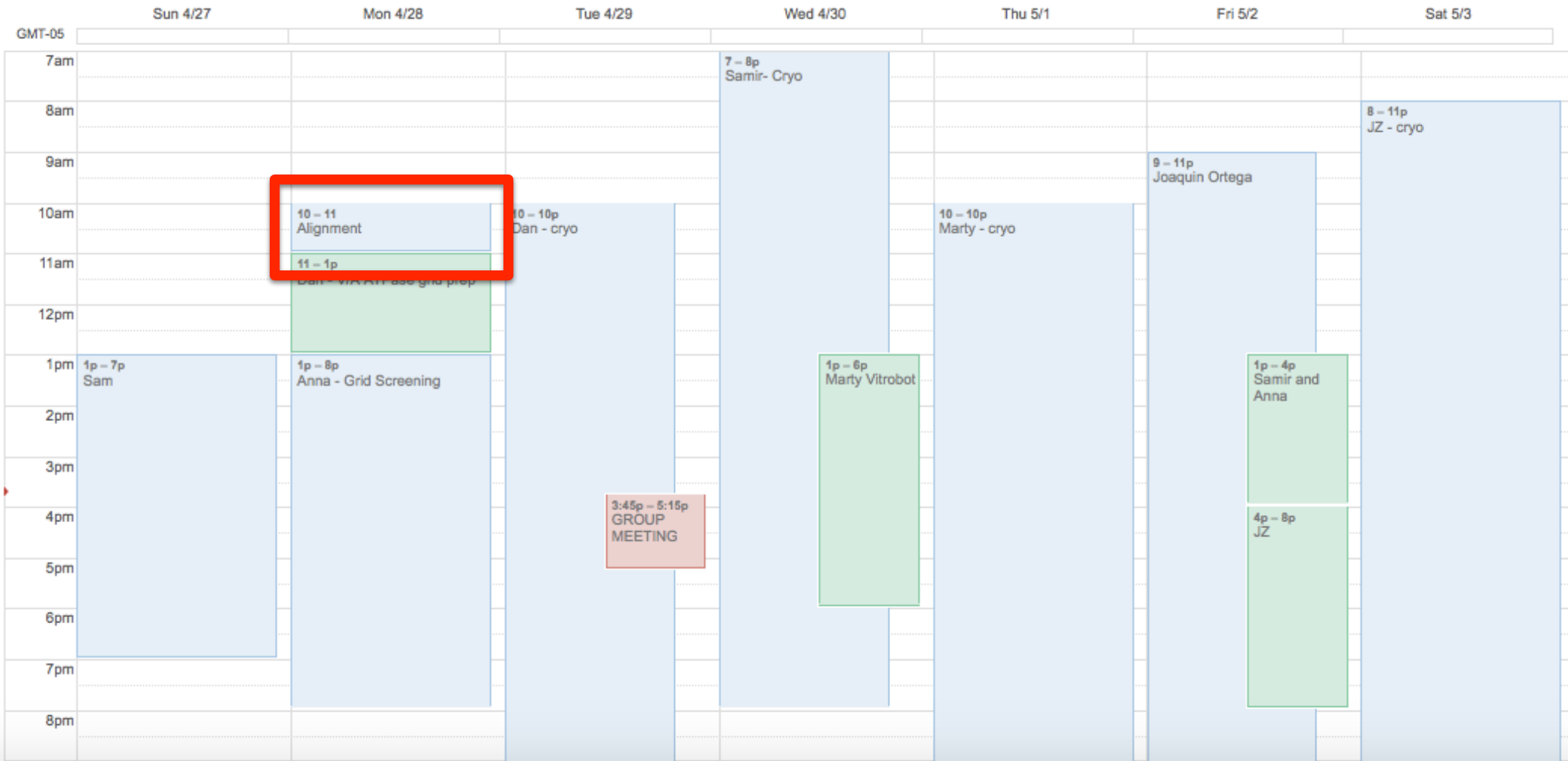
Group Size



Microscope usage policy

- Only book two regular sessions in advance
 - morning session: any time in the morning until 12:30 pm
 - afternoon session: 1 pm until any time in the evening
- You may book as many weekend sessions in advance as you want (within reason and in discussion with other group members if necessary)
- Negative stain sessions should be in the morning/Cryo-EM sessions should be in the afternoon

A busy week for the F20



A not so busy week for the F20

GMT-05	Sun 10/19	Mon 10/20	Tue 10/21	Wed 10/22	Thu 10/23	Fri 10/24	Sat 10/25
8am							
9am							
10am		10 – 11 Alignment			10 – 1p steph		
11am		11 – 1p MMJ_training				11:30 – 1p Jason - neg stain	
12pm							
1pm		1p – 6p Jason			1p – 10p Dan		1p – 7p Jason - neg stain
2pm							
3pm	3p – 5:30p Jason - neg stain						
4pm			3:45p – 5:15p GROUP MEETING				
5pm							
6pm							
7pm							
8pm							
9pm							

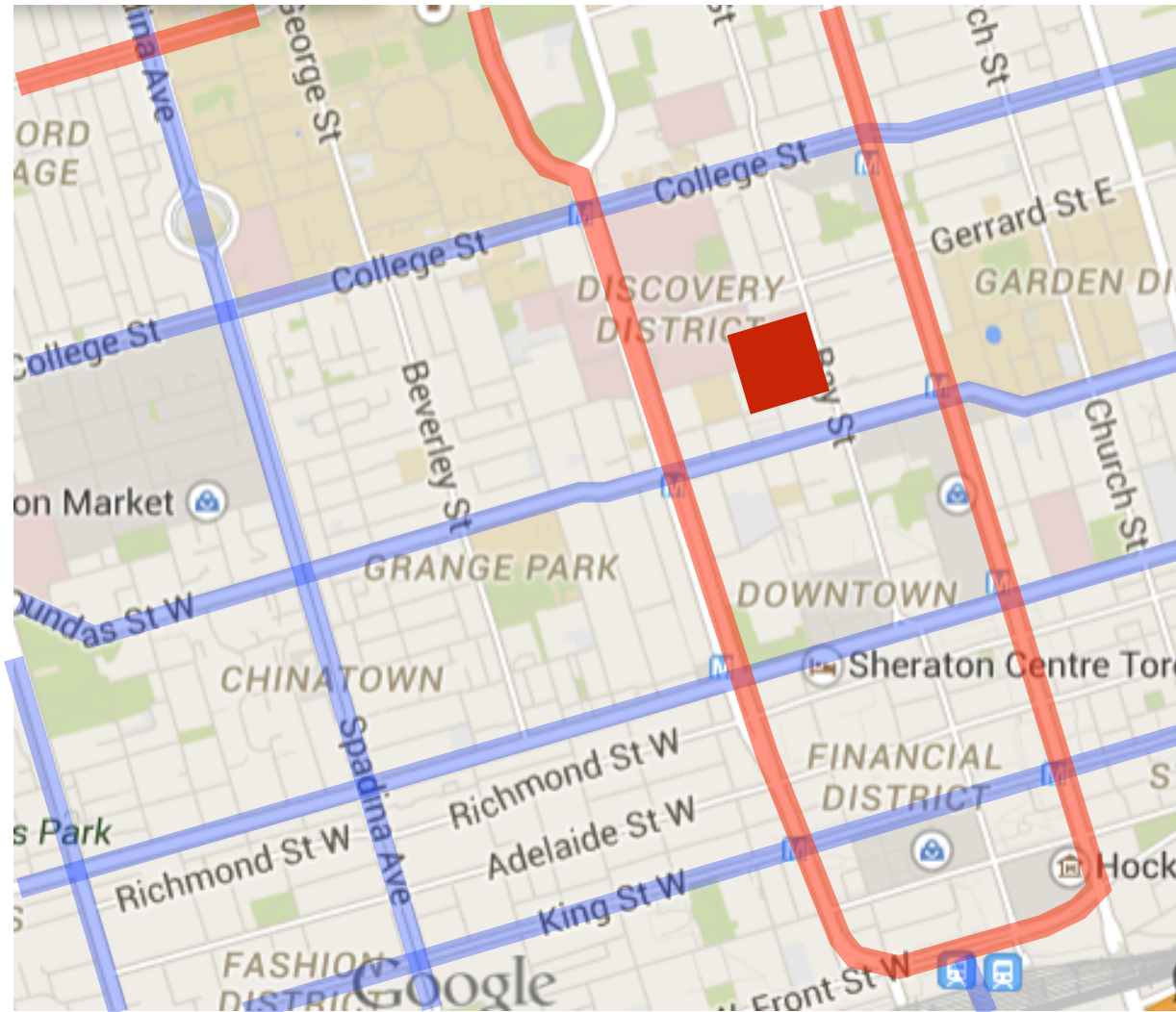
What do you need?

- Good space for a microscope
- A good microscope

New building: October 2013



Geographic factors



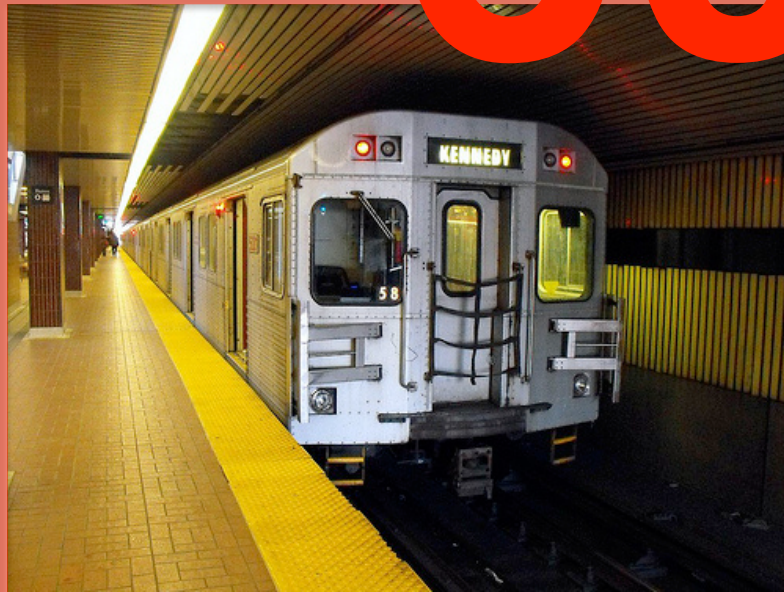
— Subway

— Streetcar

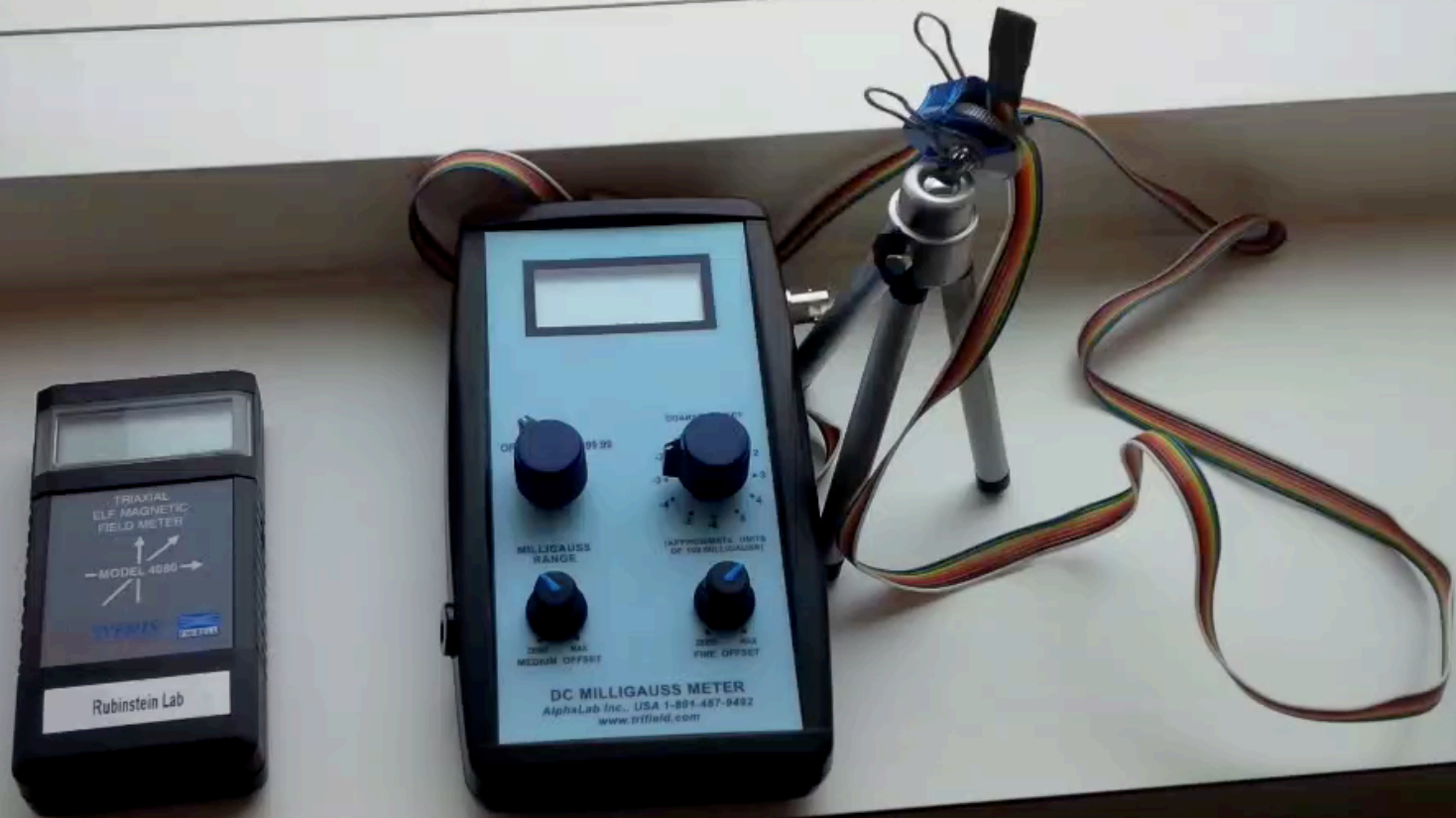
Sources of EMI



600V



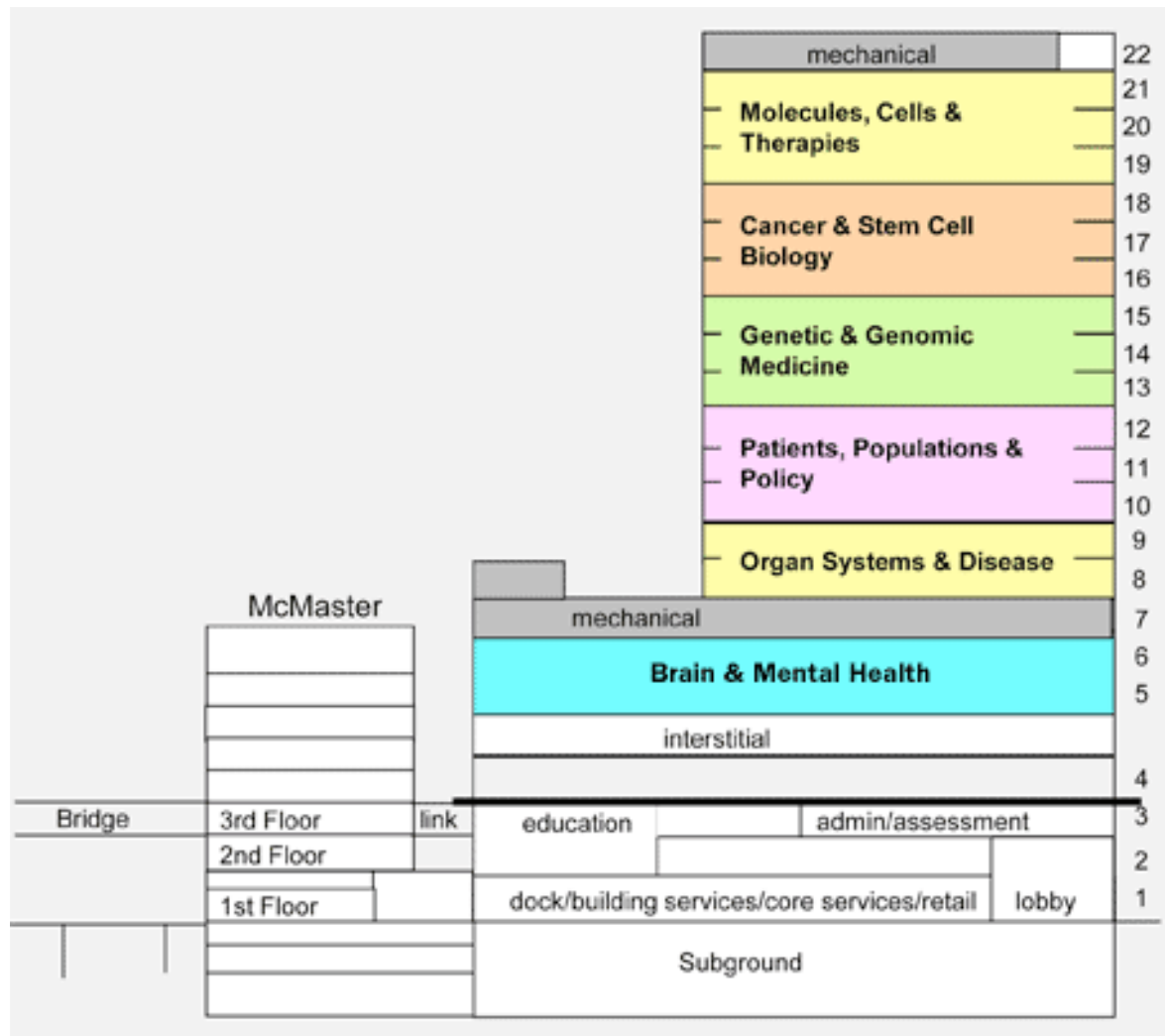
Big city magnetic fields



Big city magnetic fields



Choice of location



Rubinstein Lab

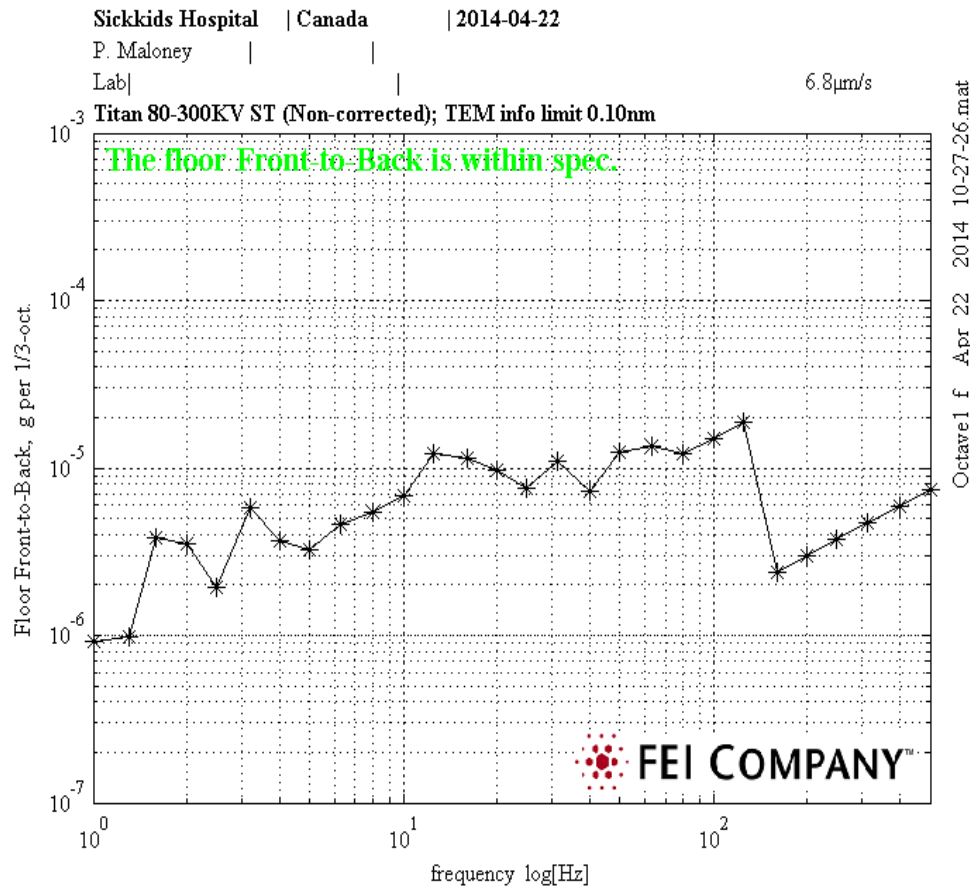
Low-frequency
building sway

Microscope sweet spot

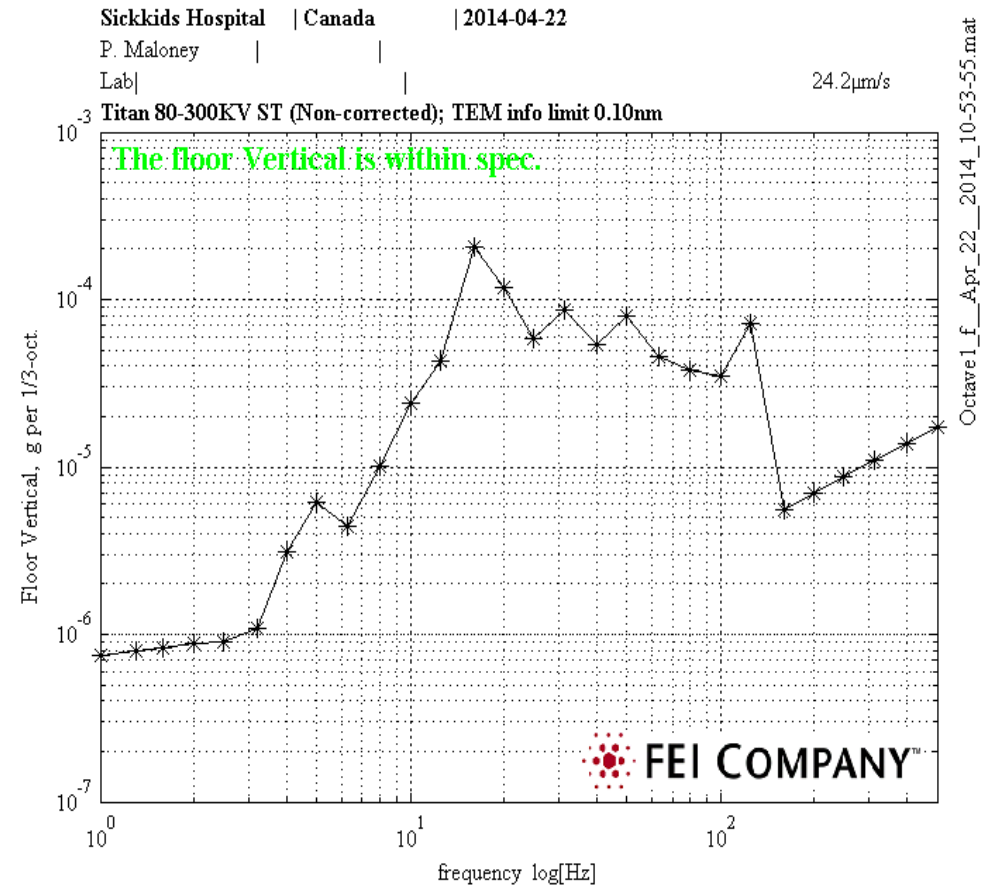
Magnetic
fields

EM facility vibration study

FRONT TO BACK FLOOR VIBRATION

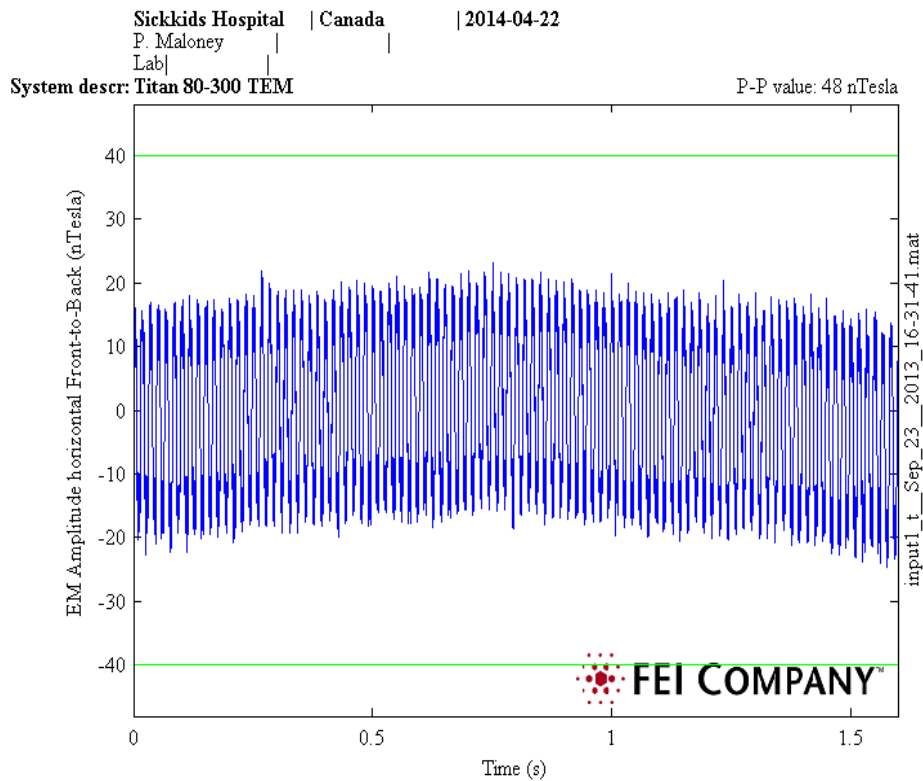


VERTICAL FLOOR VIBRATION

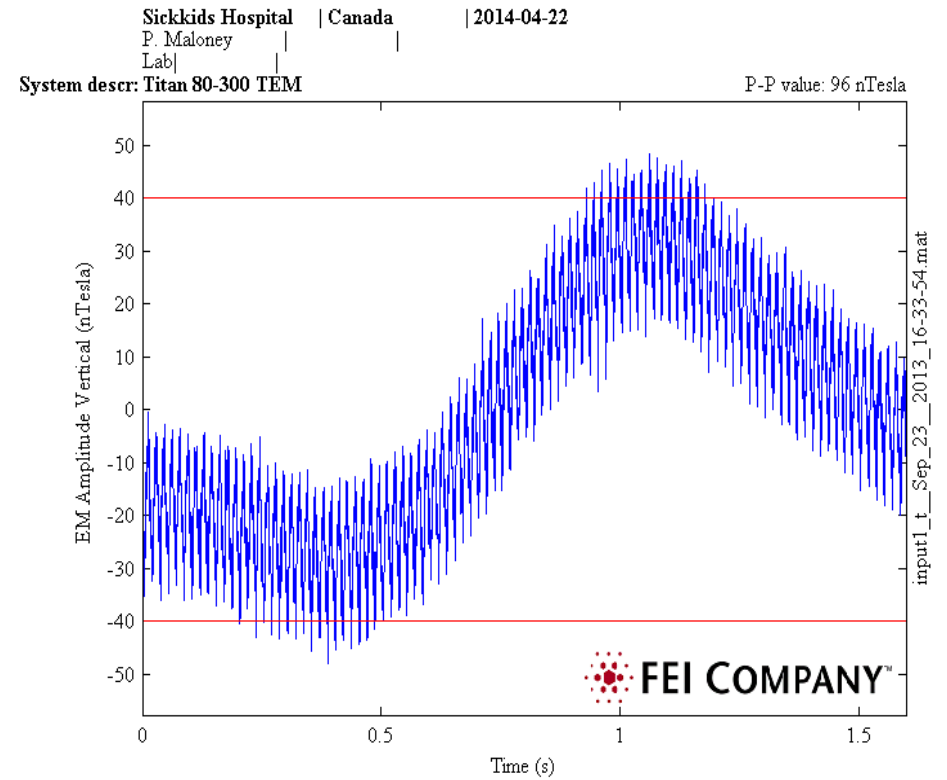


EM facility EMI study

FRONT TO BACK EMI



VERTICAL EMI



Microscope room

Feature	Option 1	Option 2
Floor vibrations	Find location with acceptable level	—
Magnetic field	Find location with acceptable level	Active cancellation system
Acoustic Noise	Isolate/insulate room from noise sources	Move noise generating components out of room
Temperature stability	Required	—
Humidity	Keep below <20% RH	—

Microscope options

Feature	Option 1	Option 2	Option 3
Voltage	300 kV	200 kV	120 kV
FEG	Yes	No	—
Stage	3200/Polara/Autoloader	Side Entry	—
Condenser lenses	3 lens system	2 lens sytem	—
Objective lens	Constant power	Non-constant power	—
Detector	K2 Summit	Falcon II/Falcon III	DirectElectron

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