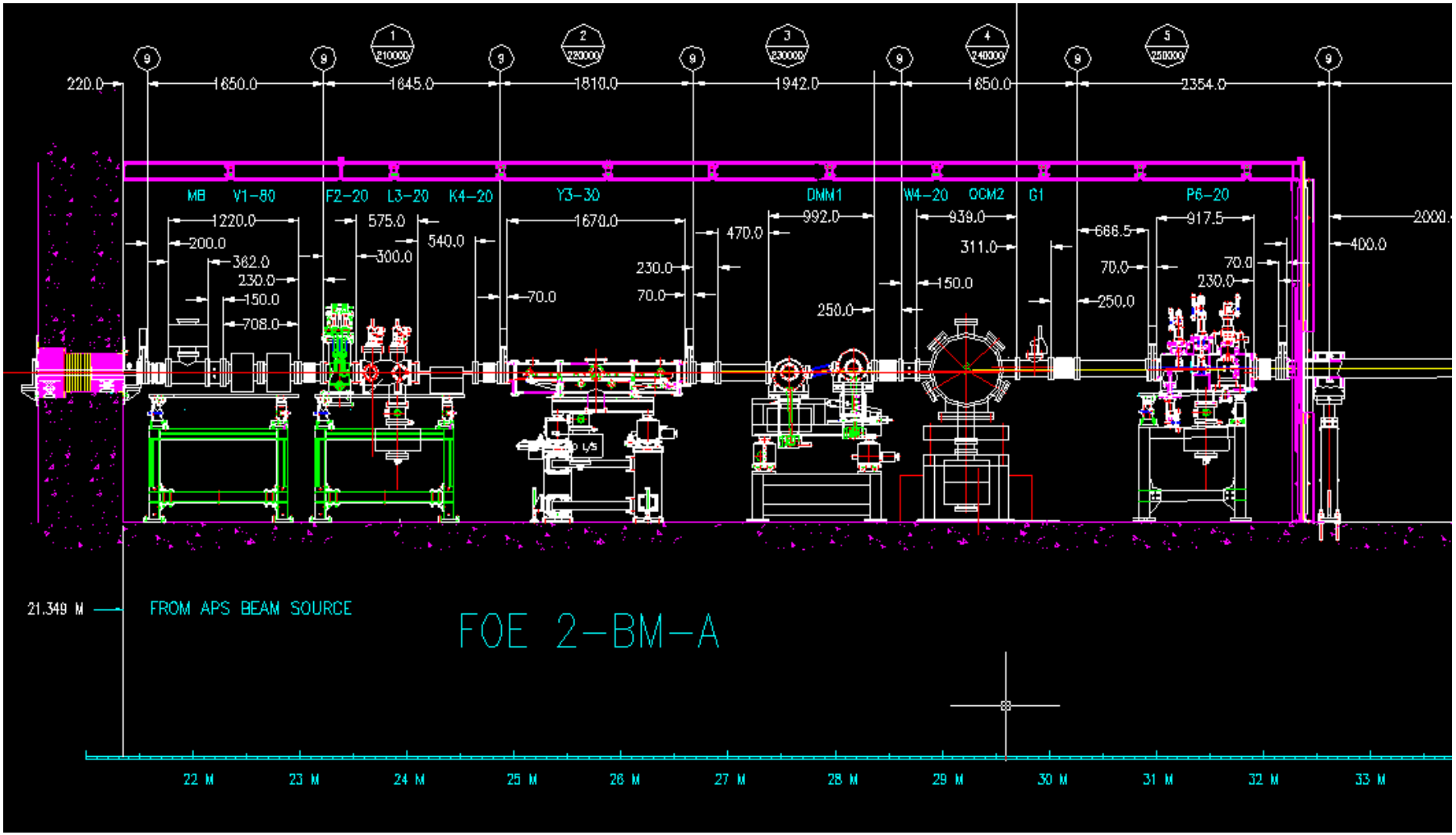
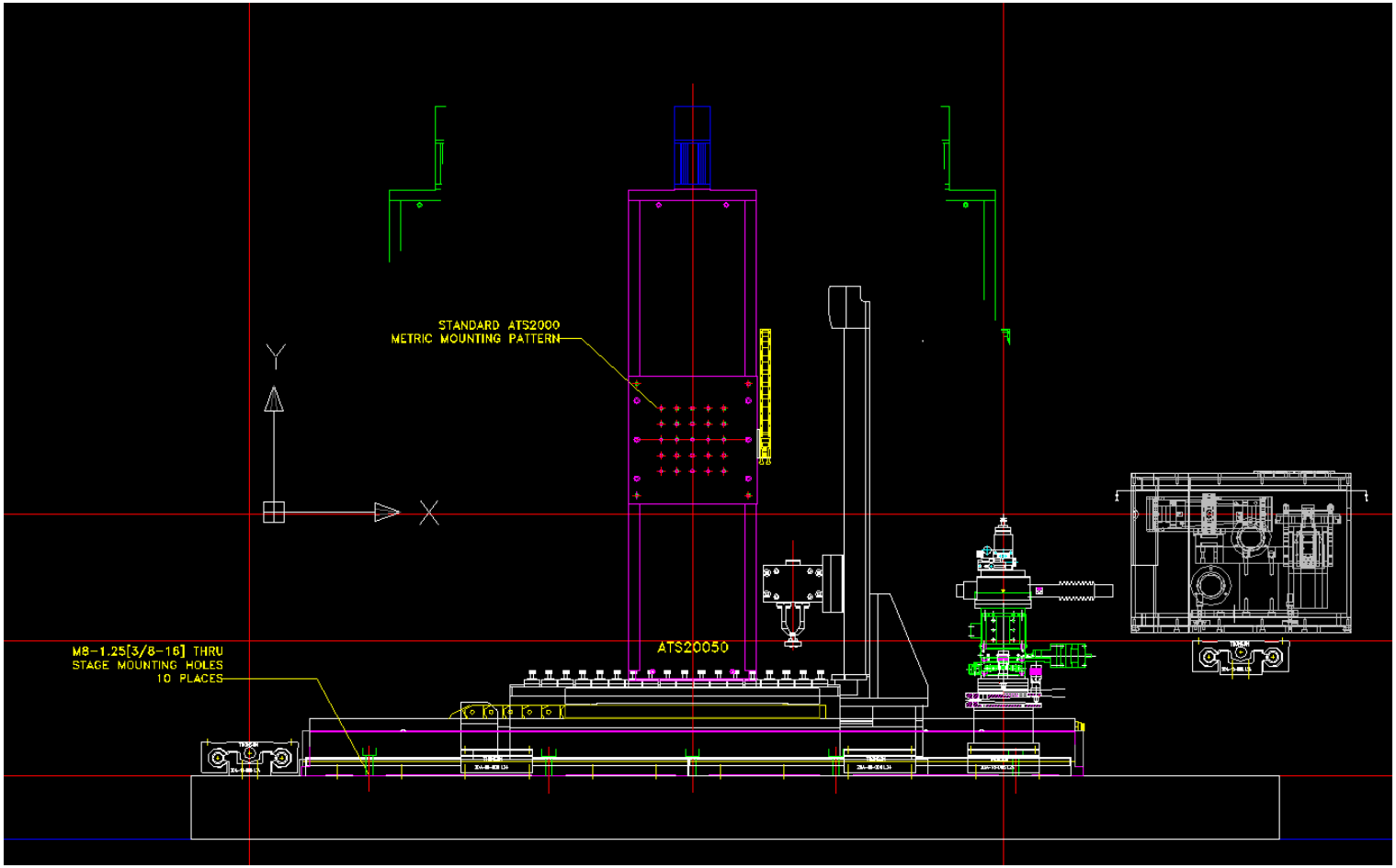
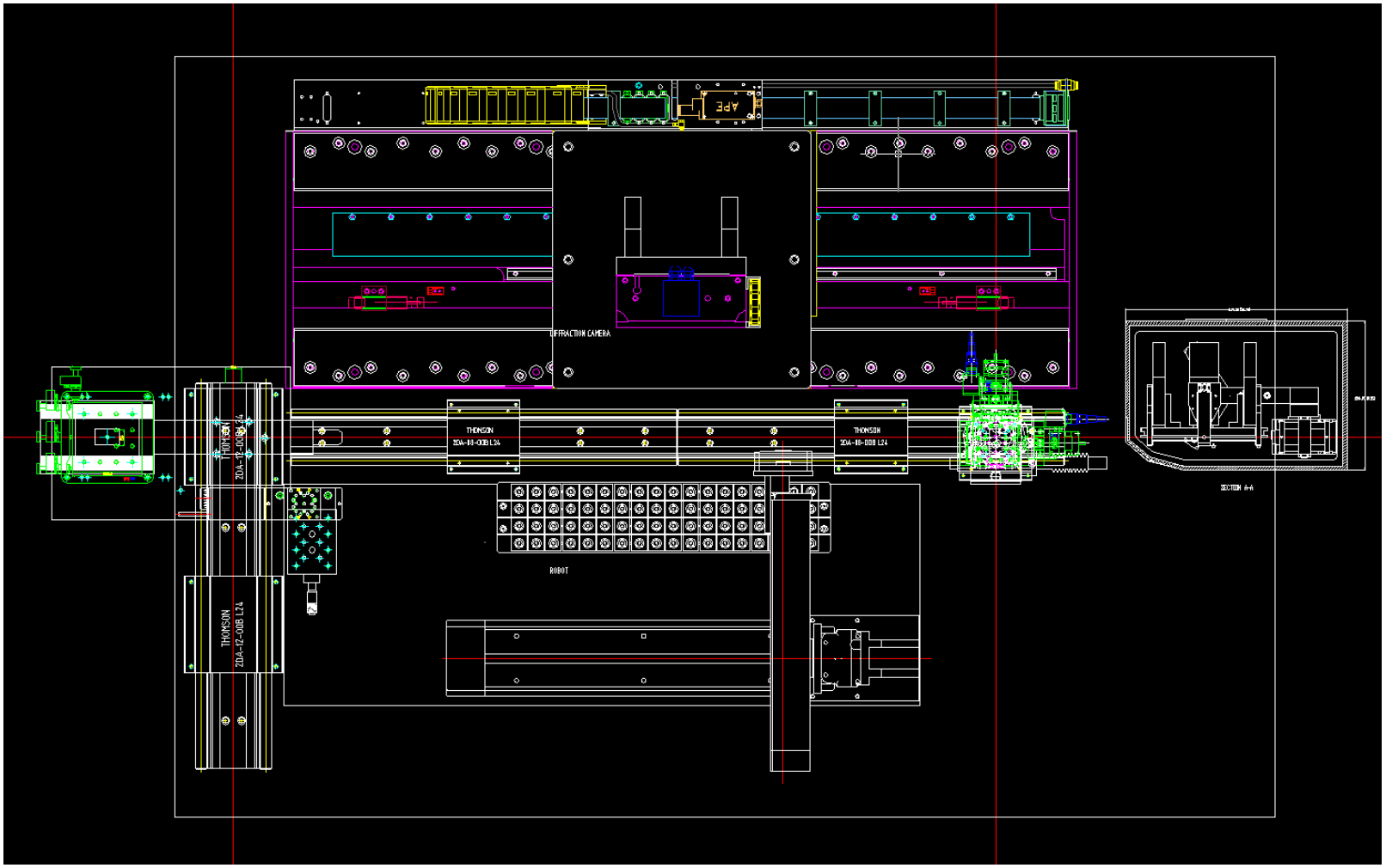
Agenda

- Discuss group objectives
  Create a forum/discussion group to share information on
  - Hardware
    - Beam line characteristics
    - CCD cameras/Scintillator screens
    - Sample mounting
    - Stages
  - Software
    - Experiment control software
    - Reconstruction code
    - Data: format, archival, distribution …
  - Problems
  - User sharing
- Define and document available tomography resources at the APS
  - Define: Presentations
  - Document: Connect web pages ?
- Future meeting schedules
- Presentation: 2BM setup

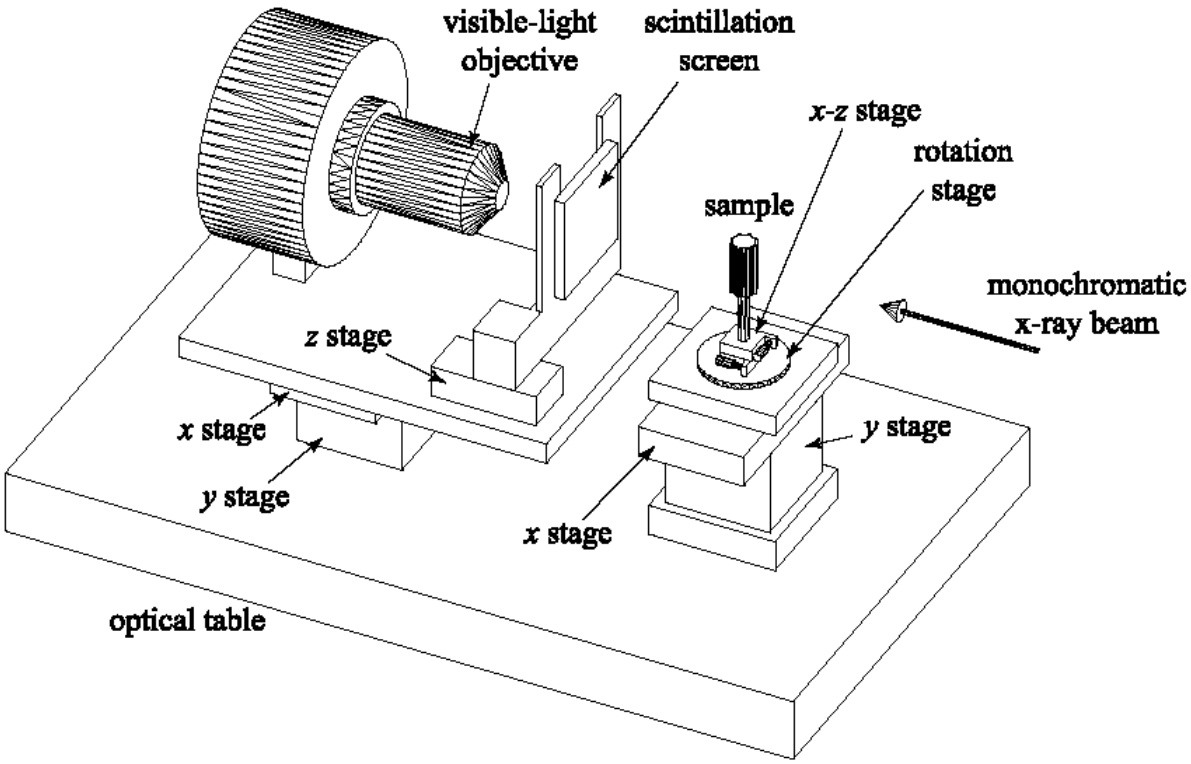
2BM-A


220.0
1650.0
1645.0
1810.0
1942.0
1650.0
2354.0
MB
V1-80
F2-20
L3-20
K4-20
Y3-30
DMM1
W4-20
QCM2
G1
P6-20
1220.0
200.0
362.0
230.0
150.0
708.0
575.0
300.0
540.0
1670.0
70.0
230.0
70.0
470.0
992.0
250.0
939.0
311.0
150.0
666.5
70.0
250.0
917.5
70.0
230.0
400.0
21.349 M
FROM APS BEAM SOURCE
FOE 2-BM-A
22 M
23 M
24 M
25 M
26 M
27 M
28 M
29 M
30 M
31 M
32 M
33 M

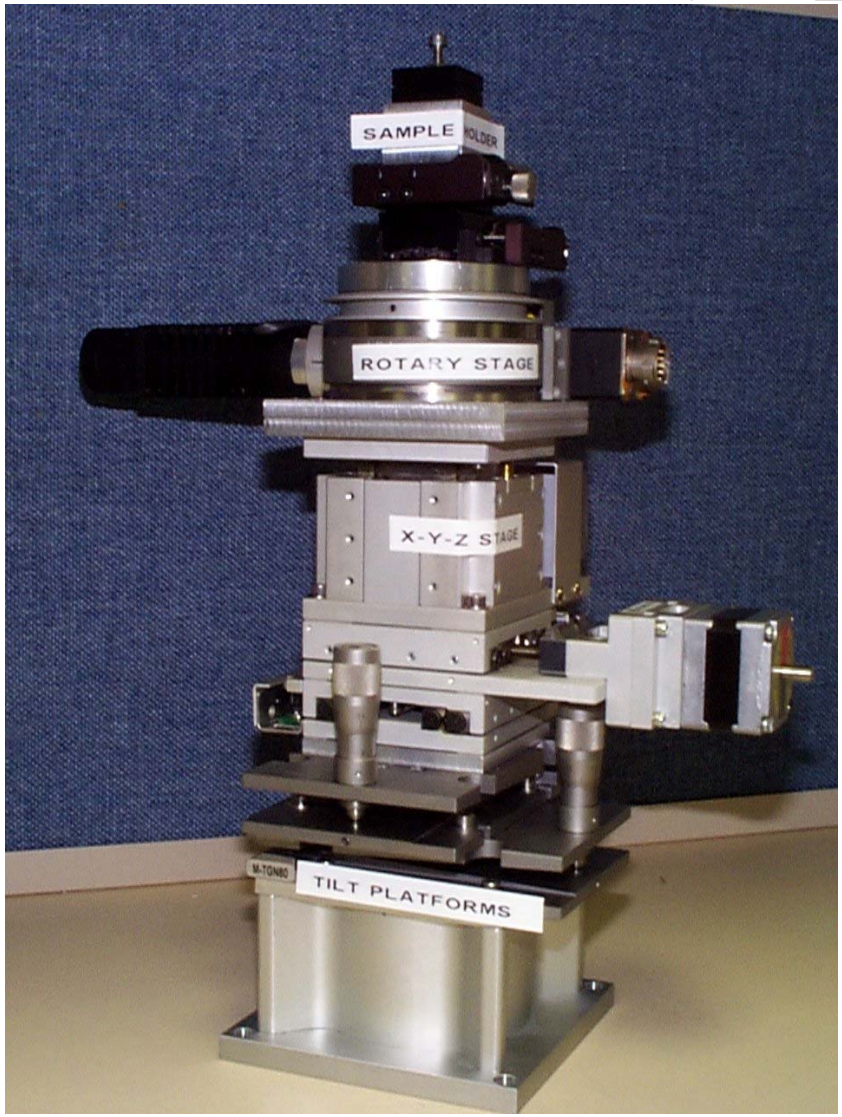

STANDARD ATS2000
METRIC MOUNTING PATTERN
Y
X
ATS20050
M8-1.25[3/8-16] THRU
STAGE MOUNTING HOLES
10 PLACES

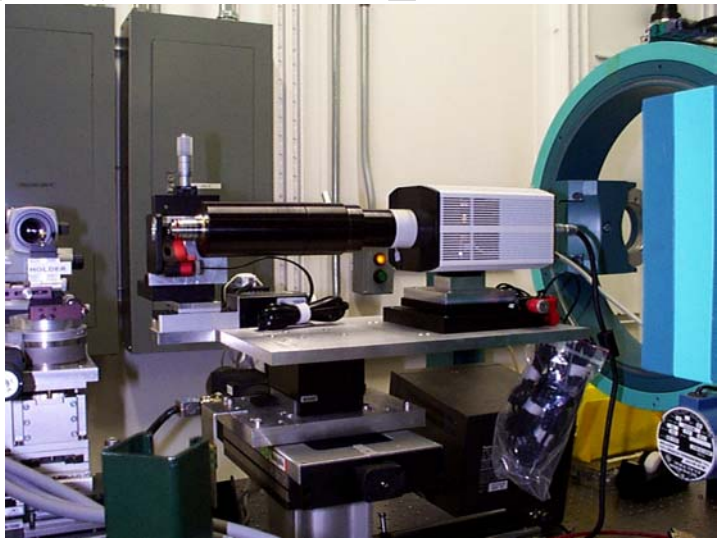

APE
DIFFRACTION CAMERA
THOMSON
20A-10-008 L24
THOMSON
20A-10-008 L24
THOMSON
20A-12-008 L24
THOMSON
20A-12-008 L24
ROBOT
SECTION A-A

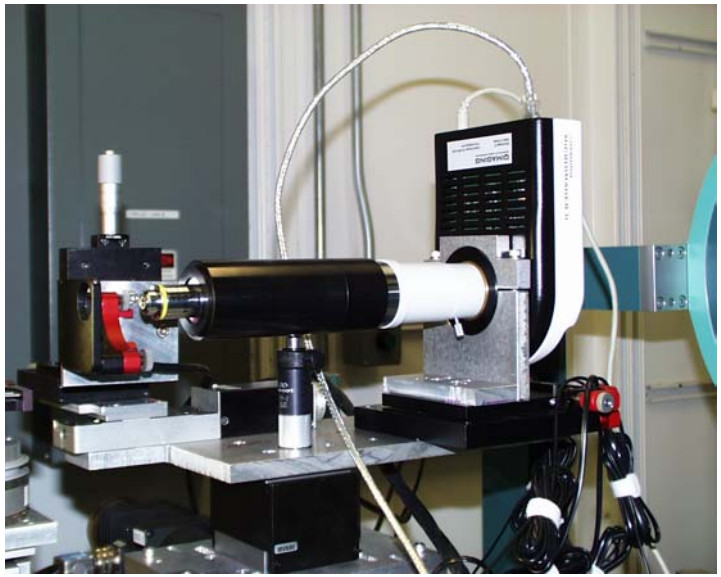
Tomography System



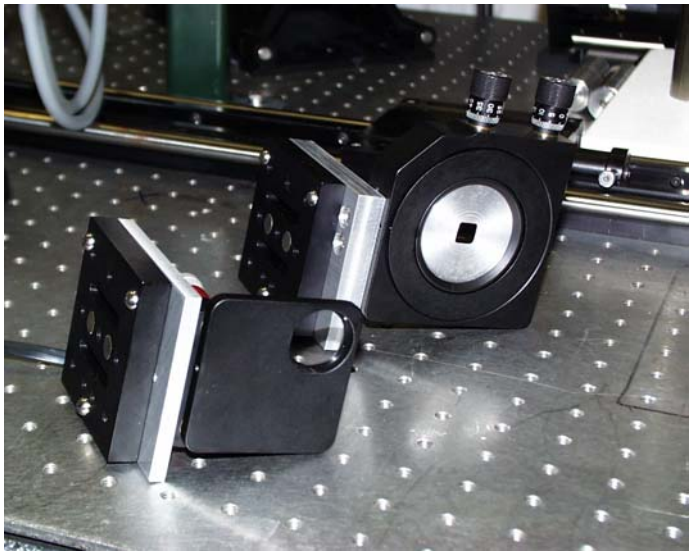
Tomography Setup







- Scintillator
  - $CdWO_4$ 10 x 10 x 0.5 mm polished
  - $CdWO_4$ 10 x 10 x 0.3 mm cleaved
  - $CdWO_4$ 25 x 25 x 0.5 mm
  - YAG:Ce film 1 μm on undoped YAG 10x10 mm x 100 μm substrate
  - YAG:Ce film 5 μm on undoped YAG 10x10 mm x 300 μm substrate



2BM
Extra Light D
Wipers para trabajo
Essuie-tout pour tr
10.25 IN.
Leica

CAUTION

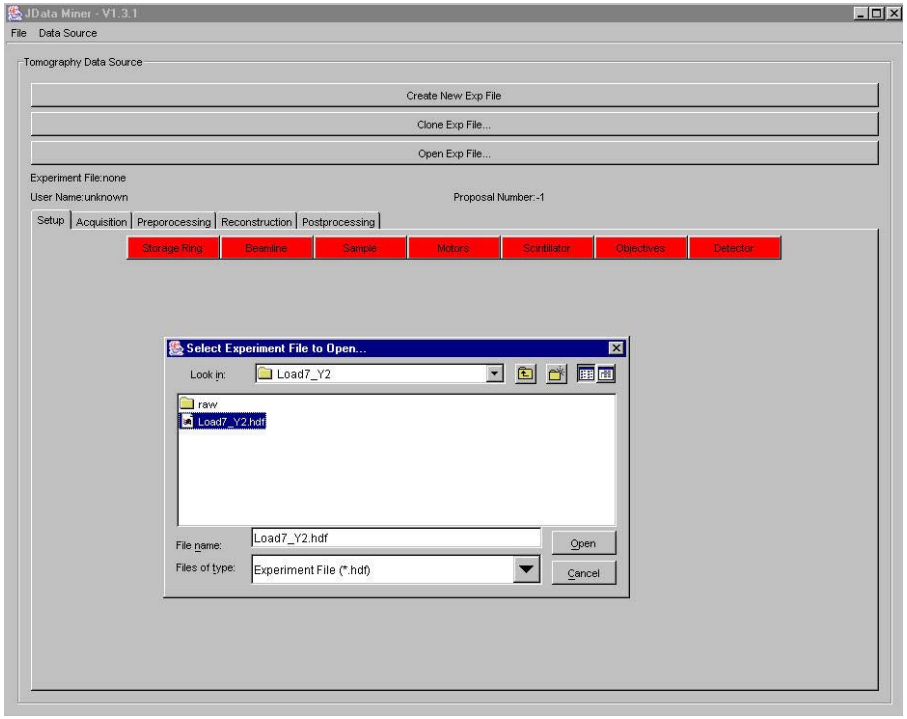
Tomography Experiment Control Software Functions

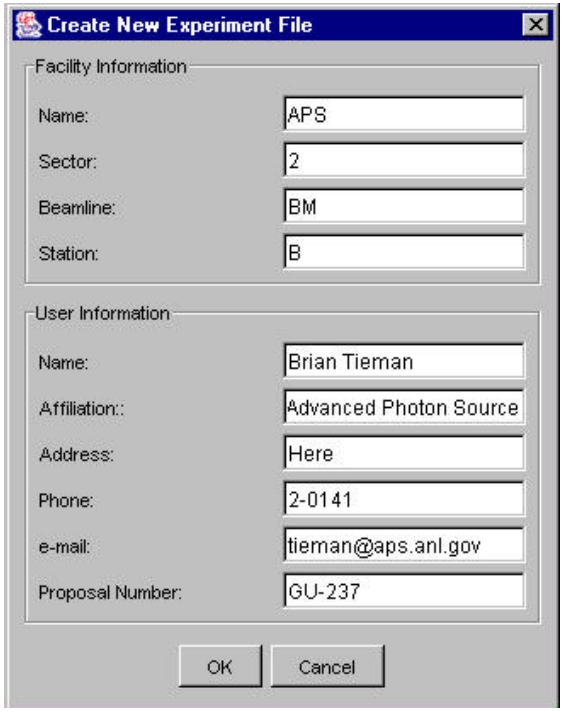
Automatically collect and reconstruct a tomography data set. This includes:

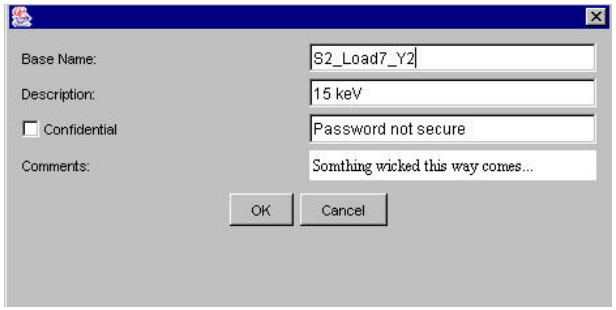
- *Setup (beam line specific parameters, sample, GU proposal, user info)*
- *Data Acquisition (control of CCD camera, sample stages, robot, beamline shutter)*
- *Prepocessing*
- *Reconstrution (cluster configuration)*
- *Postprocessing*

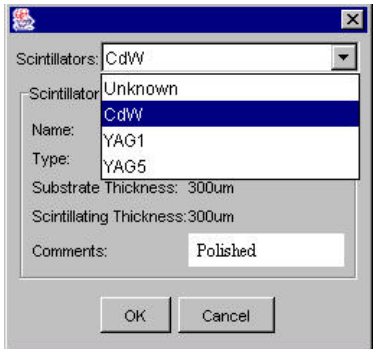
Generate an electronic log for the experiment

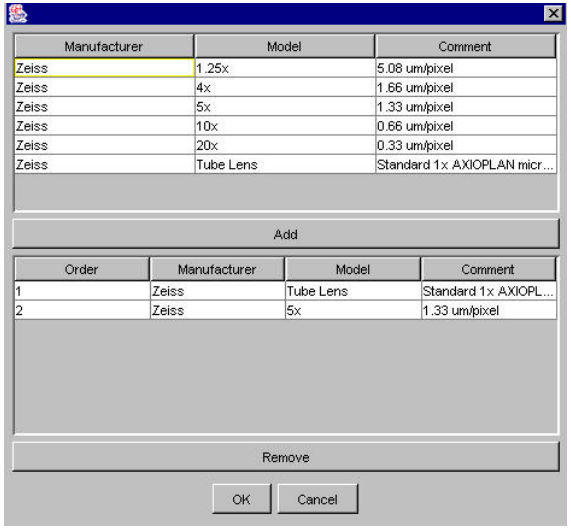
Setup


JData Miner - V1.3.1
File Data Source
Tomography Data Source
Create New Exp File
Clone Exp File...
Open Exp File...
Experiment File:none
User Name:unknown
Proposal Number:-1
Setup
Acquisition
Preporocessing
Reconstruction
Postprocessing
Storage Ring
Beamline
Sample
Motors
Scintillator
Objectives
Detector
Select Experiment File to Open...
Look in:
Load7_Y2
raw
Load7_Y2.hdf
File name:
Load7_Y2.hdf
Files of type:
Experiment File (*.hdf)
Open
Cancel

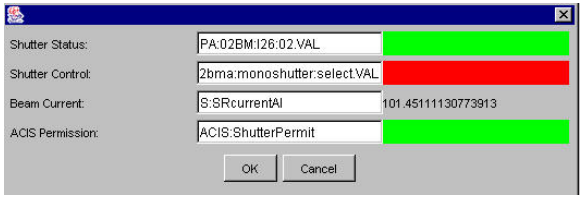

Create New Experiment File
Facility Information
Name:
APS
Sector:
2
Beamline:
BM
Station:
B
User Information
Name:
Brian Tieman
Affiliation::
Advanced Photon Source
Address:
Here
Phone:
2-0141
e-mail:
tieman@aps.anl.gov
Proposal Number:
GU-237
OK
Cancel

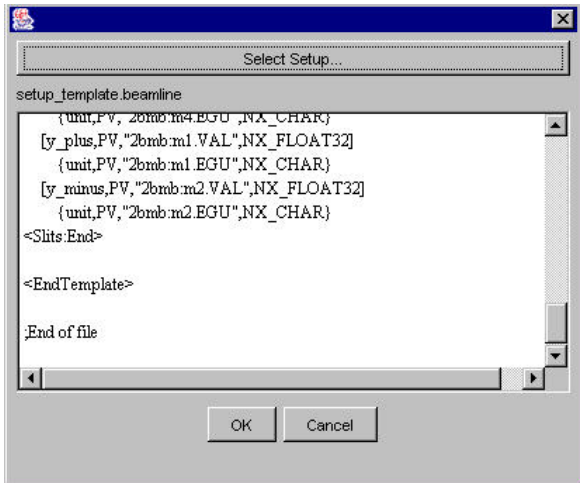

Base Name:
S2_Load7_Y2
Description:
15 keV
Confidential
Password not secure
Comments:
Somthing wicked this way comes...
OK
Cancel

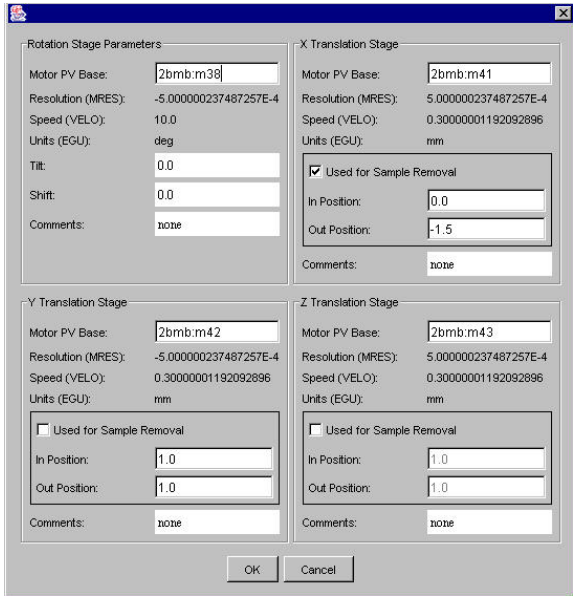

Scintillators:
CdW
Unknown
CdW
YAG1
YAG5
Scintillator
Name:
Type:
Substrate Thickness: 300um
Scintillating Thickness:300um
Comments:
Polished
OK
Cancel

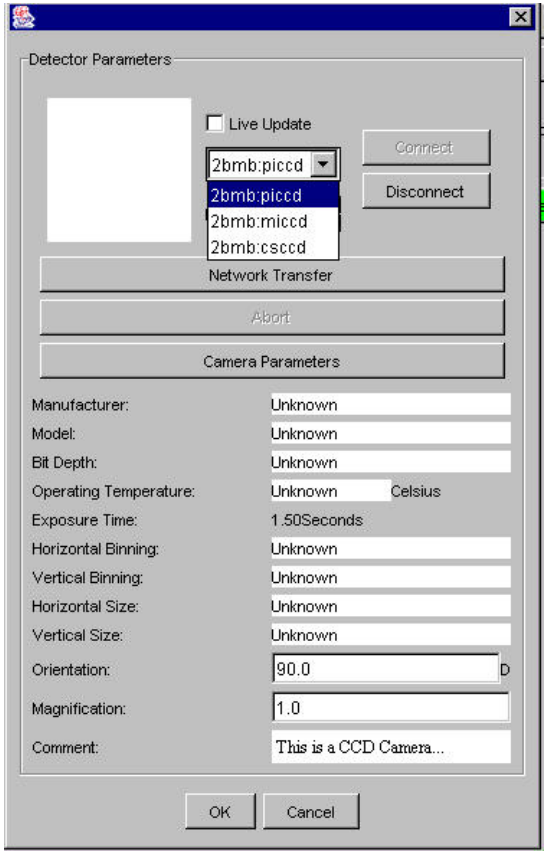

Manufacturer
Model
Comment
Zeiss
1.25x
5.08 um/pixel
Zeiss
4x
1.66 um/pixel
Zeiss
5x
1.33 um/pixel
Zeiss
10x
0.66 um/pixel
Zeiss
20x
0.33 um/pixel
Zeiss
Tube Lens
Standard 1x AXIOPLAN micr...
Add
Order
Manufacturer
Model
Comment
1
Zeiss
Tube Lens
Standard 1x AXIOPL...
2
Zeiss
5x
1.33 um/pixel
Remove
OK
Cancel

Setup


Shutter Status:
PA:02BM:I26:02.VAL
Shutter Control:
2bma:monoshutter:select.VAL
Beam Current:
S:SRcurrentAI
101.45111130773913
ACIS Permission:
ACIS:ShutterPermit
OK
Cancel


Select Setup...
setup_template.beamline
[y_plus,PV,"2bmb:m1.VAL",NX_FLOAT32]
{unit,PV,"2bmb:m1.EGU",NX_CHAR}
[y_minus,PV,"2bmb:m2.VAL",NX_FLOAT32]
{unit,PV,"2bmb:m2.EGU",NX_CHAR}
<Slits:End>
<EndTemplate>
;End of file
OK
Cancel


Rotation Stage Parameters
Motor PV Base:
2bmb:m38
Resolution (MRES):
-5.000000237487257E-4
Speed (VELO):
10.0
Units (EGU):
deg
Tilt:
0.0
Shift:
0.0
Comments:
none
X Translation Stage
Motor PV Base:
2bmb:m41
Resolution (MRES):
5.000000237487257E-4
Speed (VELO):
0.30000001192092896
Units (EGU):
mm
Used for Sample Removal
In Position:
0.0
Out Position:
-1.5
Comments:
none
Y Translation Stage
Motor PV Base:
2bmb:m42
Resolution (MRES):
-5.000000237487257E-4
Speed (VELO):
0.30000001192092896
Units (EGU):
mm
Used for Sample Removal
In Position:
1.0
Out Position:
1.0
Comments:
none
Z Translation Stage
Motor PV Base:
2bmb:m43
Resolution (MRES):
5.000000237487257E-4
Speed (VELO):
0.30000001192092896
Units (EGU):
mm
Used for Sample Removal
In Position:
1.0
Out Position:
1.0
Comments:
none
OK
Cancel


Detector Parameters
Live Update
2bmb:piccd
2bmb:piccd
2bmb:miccd
2bmb:csccd
Connect
Disconnect
Network Transfer
Abort
Camera Parameters
Manufacturer:
Unknown
Model:
Unknown
Bit Depth:
Unknown
Operating Temperature:
Unknown
Celsius
Exposure Time:
1.50Seconds
Horizontal Binning:
Unknown
Vertical Binning:
Unknown
Horizontal Size:
Unknown
Vertical Size:
Unknown
Orientation:
90.0
D
Magnification:
1.0
Comment:
This is a CCD Camera...
OK
Cancel

Data Acquisition

JData Miner - V1.3.1

File Data Source

Tomography Data Source

Create New Exp File

Clone Exp File...

Open Exp File...

Experiment File:U:\tomo\nov02\geoff\microcomp\Sample2\Load7_Y2\Load7_Y2.hdf

User Name:Brian Tieman

Proposal Number:1234567890

Setup | Acquisition | Preporocessing | Reconstruction | Postprocessing

Setup Acquisition

Frame Num...	File Name	Frame Type	Rotational A...	Angle	Sample Rem...	Sample In P...	Sample Out ...	Acquired
1	S2_Load7_Y...	Dark Field	2bmb:m38	0.0	2bmb:m41	0.0	-1.5	False
2	S2_Load7_Y...	White Field	2bmb:m38	0.0	2bmb:m41	0.0	-1.5	False
3	S2_Load7_Y...	Projection	2bmb:m38	0.0	2bmb:m41	0.0	-1.5	False
4	S2_Load7_Y...	Projection	2bmb:m38	0.25	2bmb:m41	0.0	-1.5	False
5	S2_Load7_Y...	Projection	2bmb:m38	0.5	2bmb:m41	0.0	-1.5	False

Status

Frame Information

Frame Number: 0

File Name: unknown

Angle: 0

Frame Type: projection

Storage Ring Information

Shutter Status:

Beam Current:101.44478442773914

ACIS Permission:

Acquisition Information

Rotation Stage Moving:

Translation Stage Moving:

Acquisition Control

Reconstrution

JData Miner - V1.3.1

File Data Source

Tomography Data Source

Create New Exp File

Clone Exp File...

Open Exp File...

Experiment File:U:\tomo\nov02\geoff\microcomp\Sample2\Load0_Y1\S2_Load0_Y1.hdf

User Name:Brian Tieman

Proposal Number:1234567890

Setup | Acquisition | Preprocessing | Reconstruction | Postprocessing

Reconstruction Parameters

TomoMPI Directory:C:\Java\jdmV1.3.1\Tomo_Defaults Browse...

Reconstruction Algorithm: GRIDREC

Prefilter: Hann

Files Per Pass: 32 64 128 256

Data Group Index: ;entry1;data;data

Cluster Parameters

Start Reconstruction

Cluster Configuration Parameters

Node1 (Fantasia): 1

Node2 (Orange): 0 1

Node3 (Yellow): 0 1 2

Node4 (Green): 0 1 2

Node5 (Blue): 0 1 2

Node6 (Violet): 0 1 2

Node11 (Celeste): 0 1 2

Node12 (Brown): 0 1 2

Node13 (Gold): 0 1 2

Node14 (Ivory): 0 1 2

Node15 (Maroon): 0 1 2

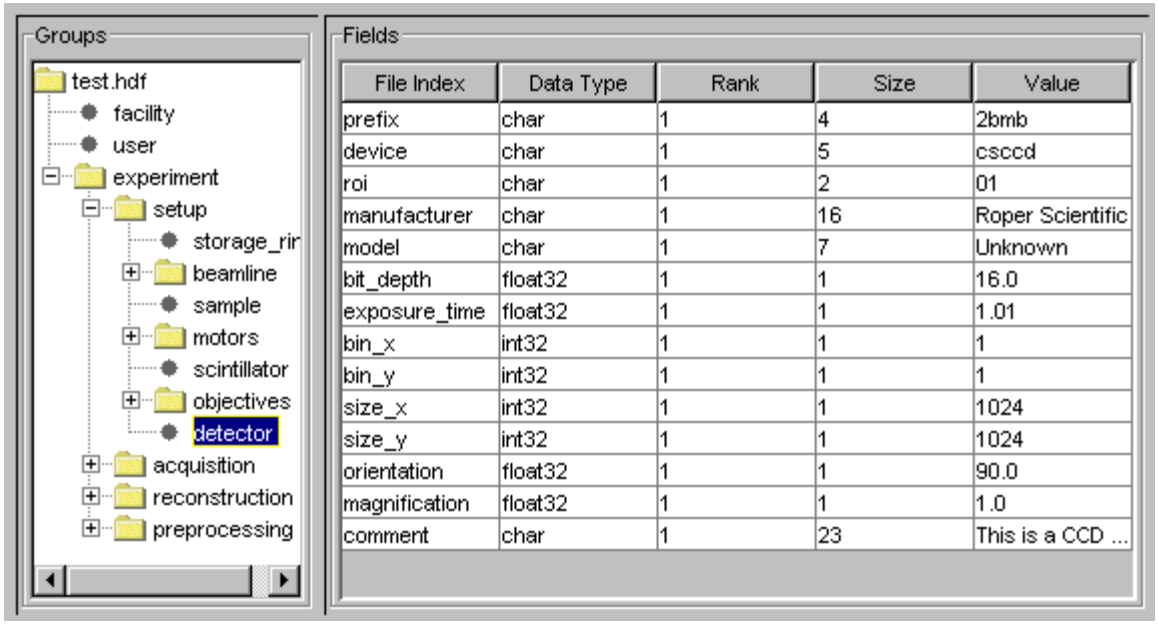
Node16 (Cyan): 0 1 2

Node17 (Silver): 0 1 2

Node19 (Purple): 0 1 2

OK Cancel

Generate an electronic log for the experiment



File Index	Data Type	Rank	Size	Value
prefix	char	1	4	2bmb
device	char	1	5	csccd
roi	char	1	2	01
manufacturer	char	1	16	Roper Scientific
model	char	1	7	Unknown
bit_depth	float32	1	1	16.0
exposure_time	float32	1	1	1.01
bin_x	int32	1	1	1
bin_y	int32	1	1	1
size_x	int32	1	1	1024
size_y	int32	1	1	1024
orientation	float32	1	1	90.0
magnification	float32	1	1	1.0
comment	char	1	23	This is a CCD ...

C:\TomoMPI\

File View Analyse Tools Help Special

Cross Corretation Shift (X, Y, Xshift) 0 0 0

Start 0

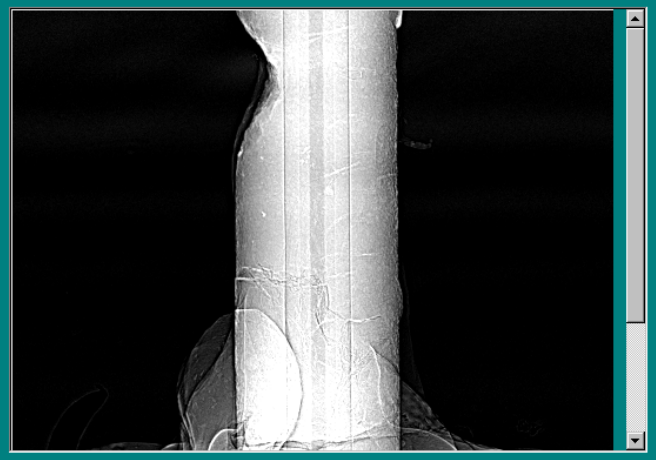
End 0

Weight X Shift 0

Weight Tilt 0

Manual X Shift 0

Manual Tilt Angle 0



Rotate by 90 deg

Experiment Name	S2_Load0_Y1.hdf
File Size	524288
Loaded Bytes	262144
Picture Size	(512 512)
Cursor Position	(507 309)
Pixel Value	0.00194415438454598
Mean, StdDev, Var	(0.299965\0.3606970.2051714)

Data File 1

Normalized Data File 3

Sinogram File 1

Reconstruction 1

Showing Normalized Data D:\Load0_Y1\normalized\norm_S2_Load0_Y1_00003.hdf at 0 deg

ExperimentOpenFile

Experiment Selection

File Name D:\test.hdf Browse...

OK

Proposal Number: GU-323

BIN

User

Name	Stock, Stuart
Affiliation	Northwestern Univ. Medical School
Address	303 E. Chicago Ave., Chicago, IL
Phone	(708) 756 8324
E-mail	s-stock@northwestern.edu

Sample

Name	test2048
Description	test data set
Confidential	NO
Comment	Somthing wicked this way comes...
Data Collected On	Sun Nov 24 14:15:31 CST 2002

Facility

Name	Sector	Beamline	Station
APS	2	BM	B

Setup

Beamline

Beam Mode	Mono			
Filter A	None			
Filter B	None			
A Slits X/Y (Center/Witdth)	0	6	0	1.6
Mirror Coating	Cr			
Monocromator	Kohzu DCM	15		
B Slits X/Y (Center/Witdth)	0	1.2	32	1

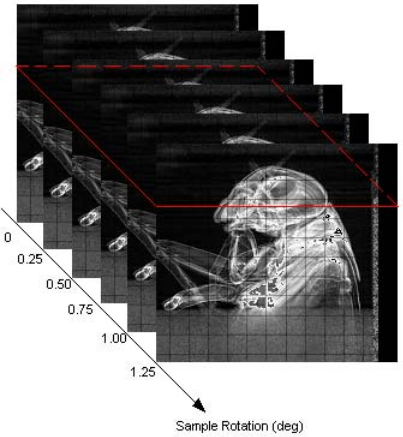
CCD Camera

Name	2bmb	csccd	01 Roper	CoolSnap
Bit Depth	16			
Exposure Time (s)	6			
Bin (X, Y)	1	1		
Size (X, Y)	1024	1024		
Objective 1	Zeiss	Tube Lens		
Objective 2	Zeiss	5x		
Scintillator	YAG	YAG		
Magnification	1			
Comment	Somthing wicked this way comes...			

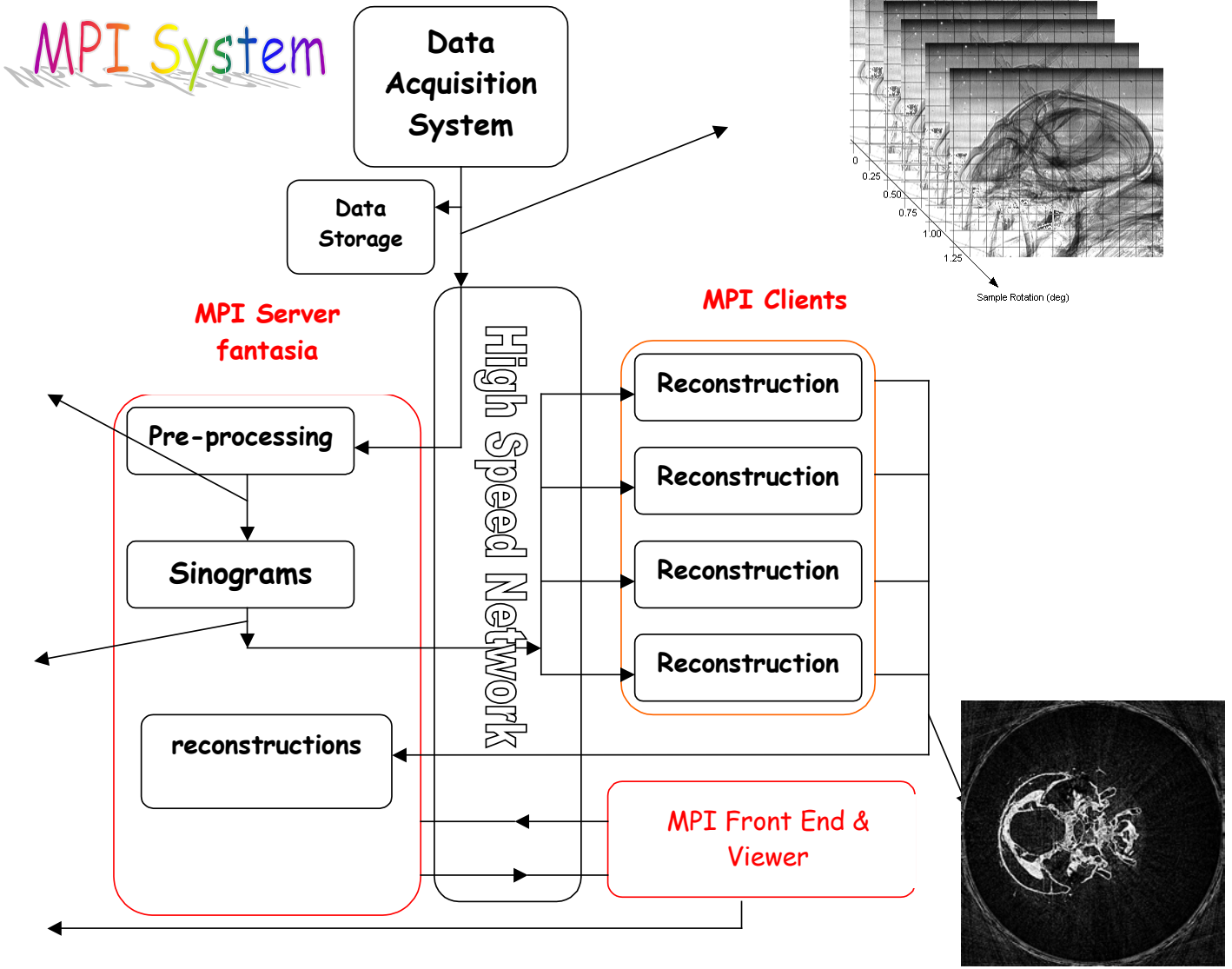
Acquisition Parameters

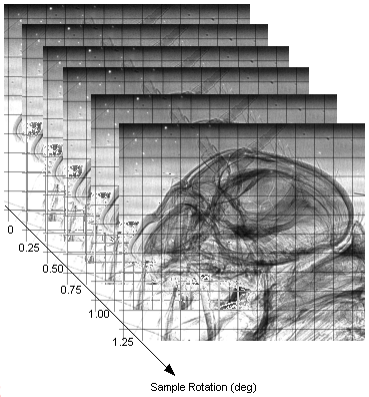
Angle (Start, End, interval)	0	180	0.25
White/Dark Field Frequency	20		
Total Files	797		

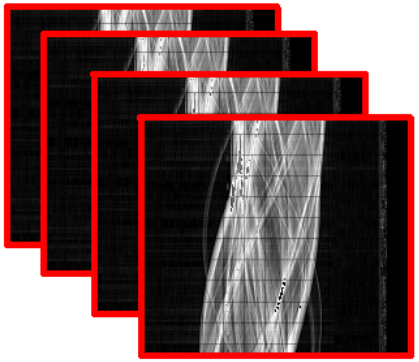
Experiment File Created On Thu Jan 16 15:38:23 CST 2003

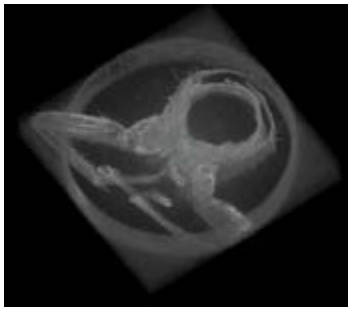

0
0.25
0.50
0.75
1.00
1.25
Sample Rotation (deg)

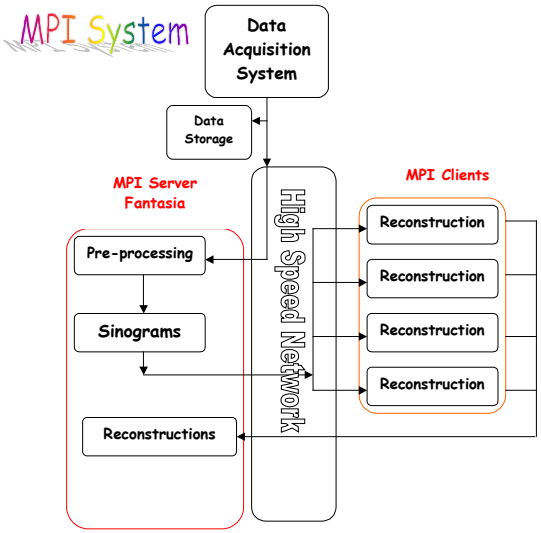
MPI System

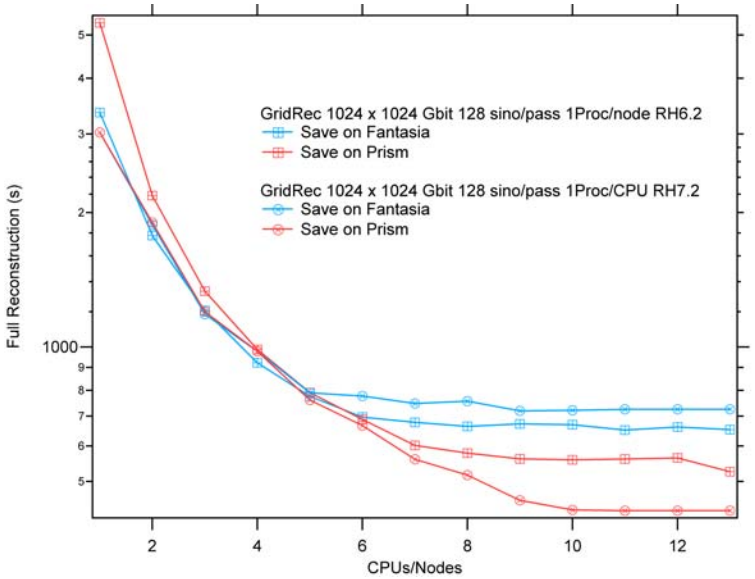

Data Acquisition System
Data Storage
MPI Server fantasia
Pre-processing
Sinograms
reconstructions
High Speed Network
MPI Clients
Reconstruction
Reconstruction
Reconstruction
Reconstruction
MPI Front End & Viewer

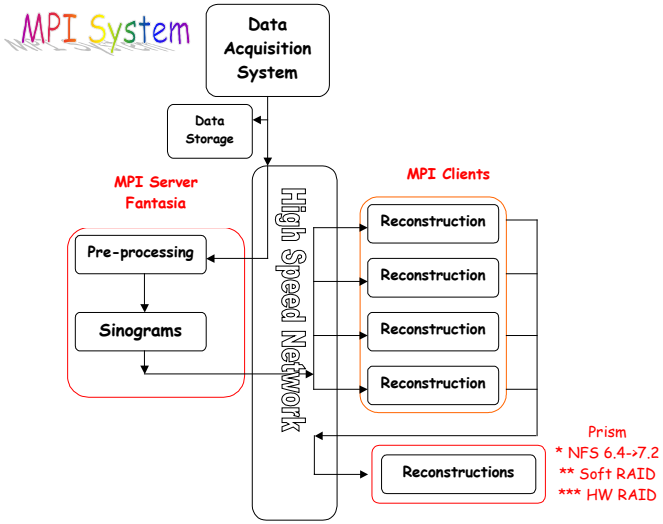

0
0.25
0.50
0.75
1.00
1.25
Sample Rotation (deg)

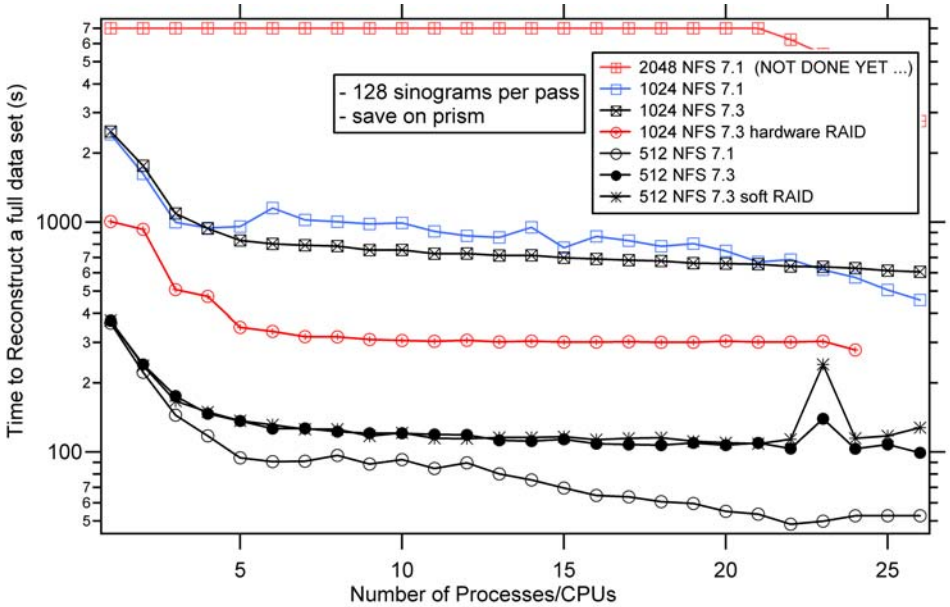


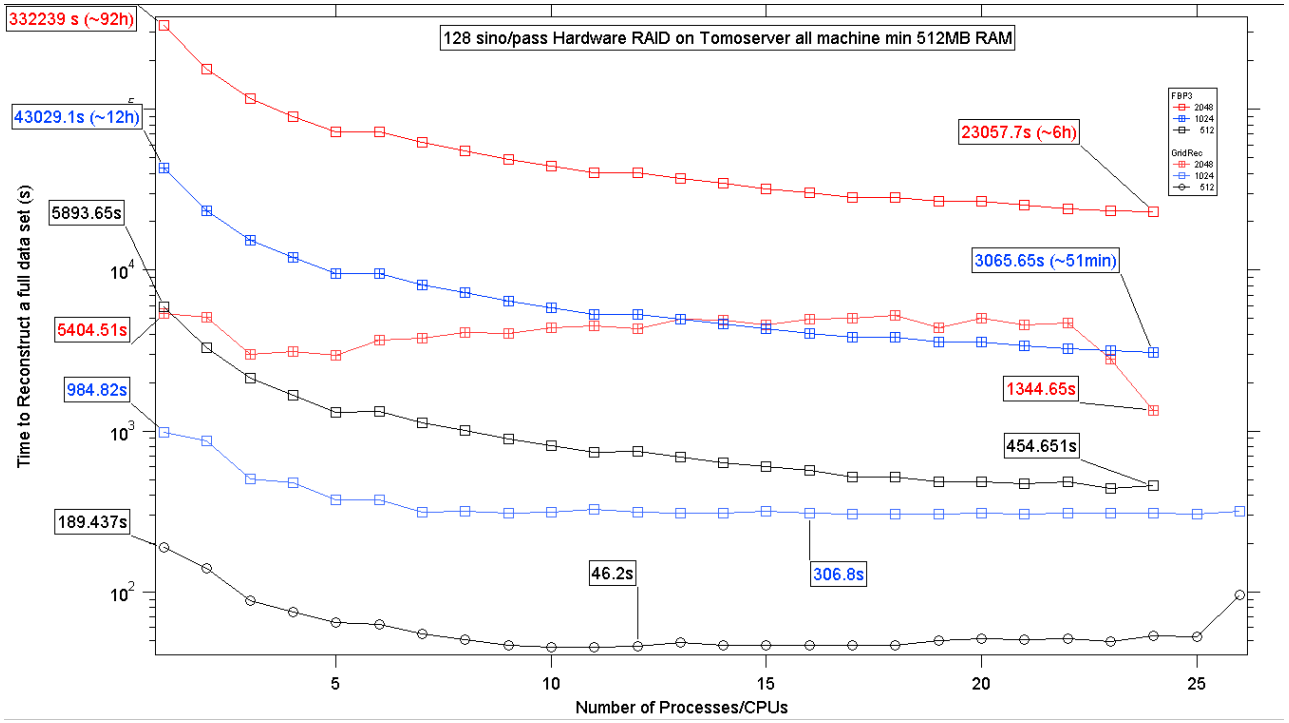


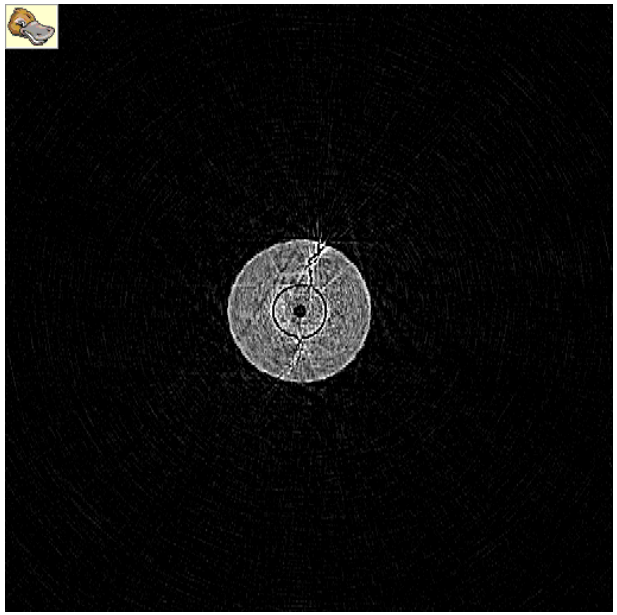

MPI System
Data Acquisition System
Data Storage
MPI Server Fantasia
Pre-processing
Sinograms
Reconstructions
High Speed Network
MPI Clients
Reconstruction
Reconstruction
Reconstruction
Reconstruction

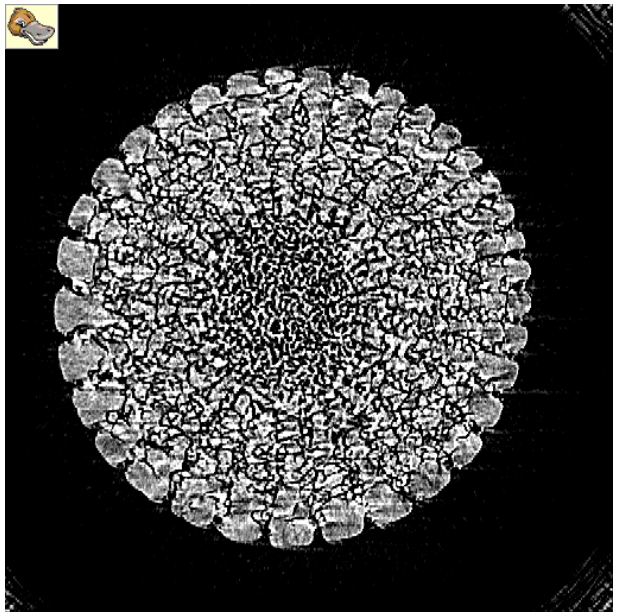

GridRec 1024 x 1024 Gbit 128 sino/pass 1Proc/node RH6.2
Save on Fantasia
Save on Prism
GridRec 1024 x 1024 Gbit 128 sino/pass 1Proc/CPU RH7.2
Save on Fantasia
Save on Prism
Full Reconstruction (s)
CPUs/Nodes


MPI System
Data Acquisition System
Data Storage
MPI Server Fantasia
Pre-processing
Sinograms
High Speed Network
MPI Clients
Reconstruction
Reconstruction
Reconstruction
Reconstruction
Reconstructions
Prism
* NFS 6.4->7.2
** Soft RAID
*** HW RAID


- 128 sinograms per pass
- save on prism
2048 NFS 7.1 (NOT DONE YET ...)
1024 NFS 7.1
1024 NFS 7.3
1024 NFS 7.3 hardware RAID
512 NFS 7.1
512 NFS 7.3
512 NFS 7.3 soft RAID
Time to Reconstruct a full data set (s)
Number of Processes/CPUs


128 sino/pass Hardware RAID on Tomoserver all machine min 512MB RAM
332239 s (~92h)
43029.1s (~12h)
5893.65s
5404.51s
984.82s
189.437s
23057.7s (~6h)
3065.65s (~51min)
1344.65s
454.651s
46.2s
306.8s
FBP3
2048
1024
512
GridRec
2048
1024
512
Time to Reconstruct a full data set (s)
10^4
10^3
10^2
5
10
15
20
25
Number of Processes/CPUs





What we are developing:

- **Phase-Contrast Tomography Techniques**
    - Reconstruction algorithms
    - Local Tomography Problem
- **Sample Changer integration in the beam line software**

What we don’t have:

- **Custom 3D rendering tools**
- **Post reconstruction data analysis**
- **…**