

# LS-CAT Remote User Control

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Northwestern University

Lead UI programmer:

Max Brister (New Mexico Tech)

LS-CAT Staff (Alpha/Beta Sufferers)

Janson Ackley

Spencer Anderson

Michael Bolbat

Nancy Brennan

Joseph Brunzelle

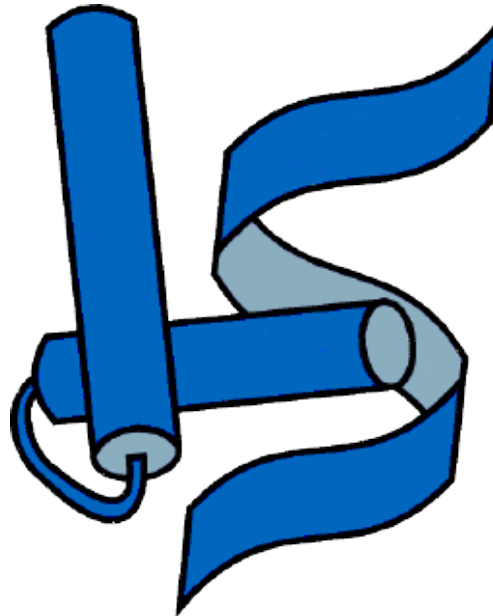
Elena Kondrashkina

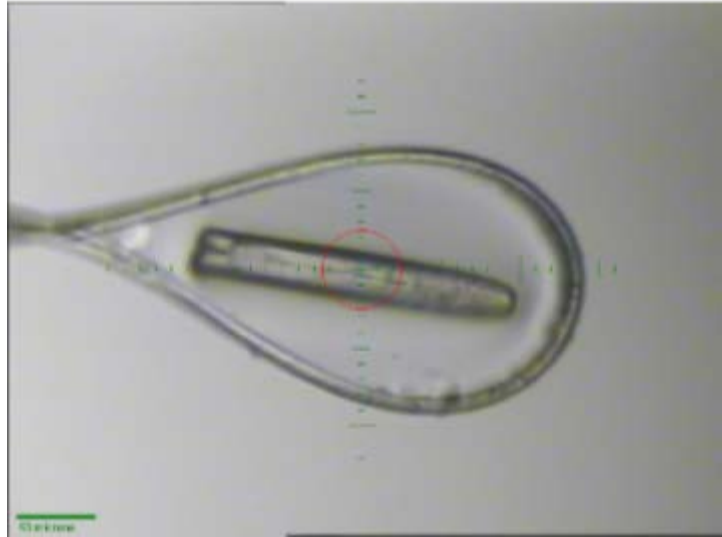
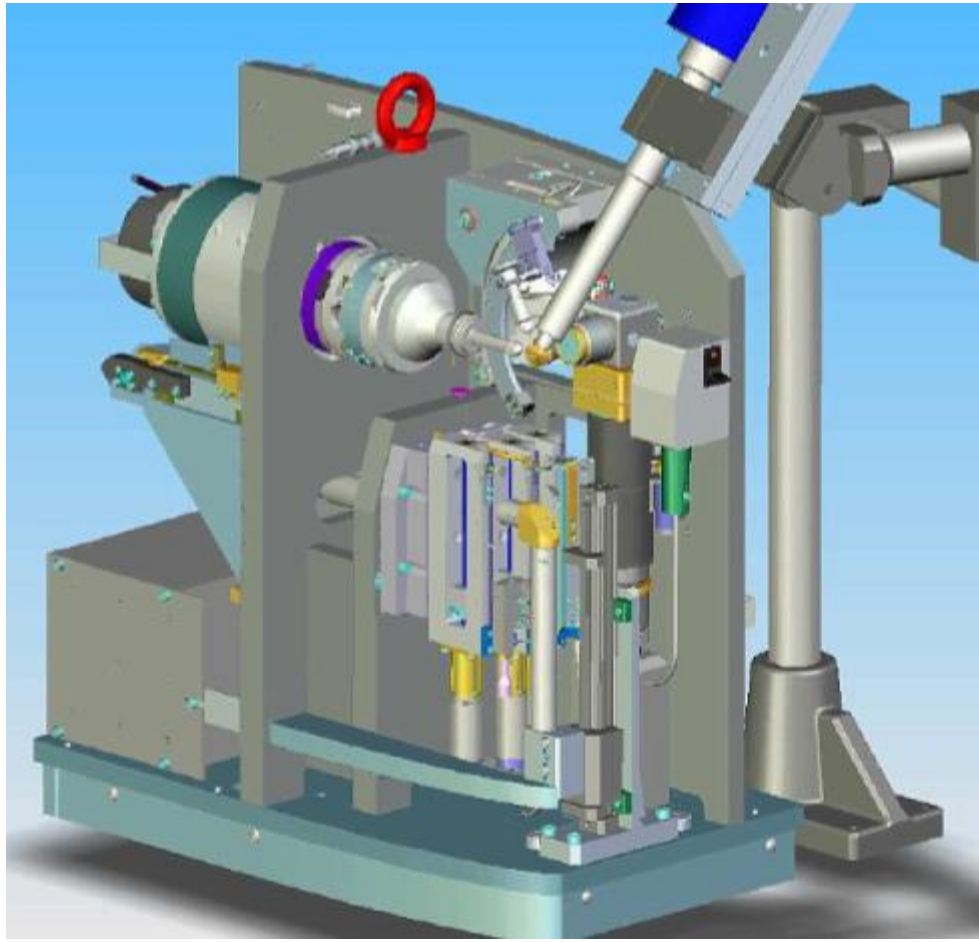
Shashank Sharma

David Smith

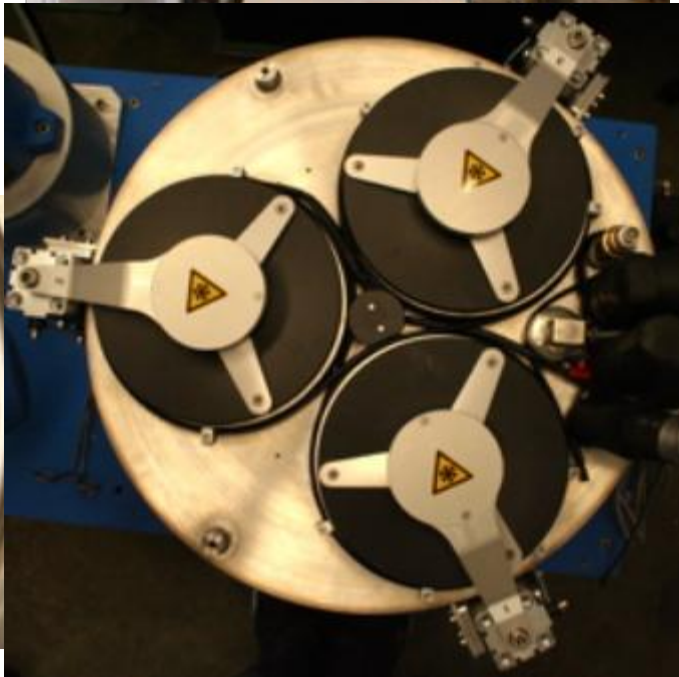
Jay VonOsinski

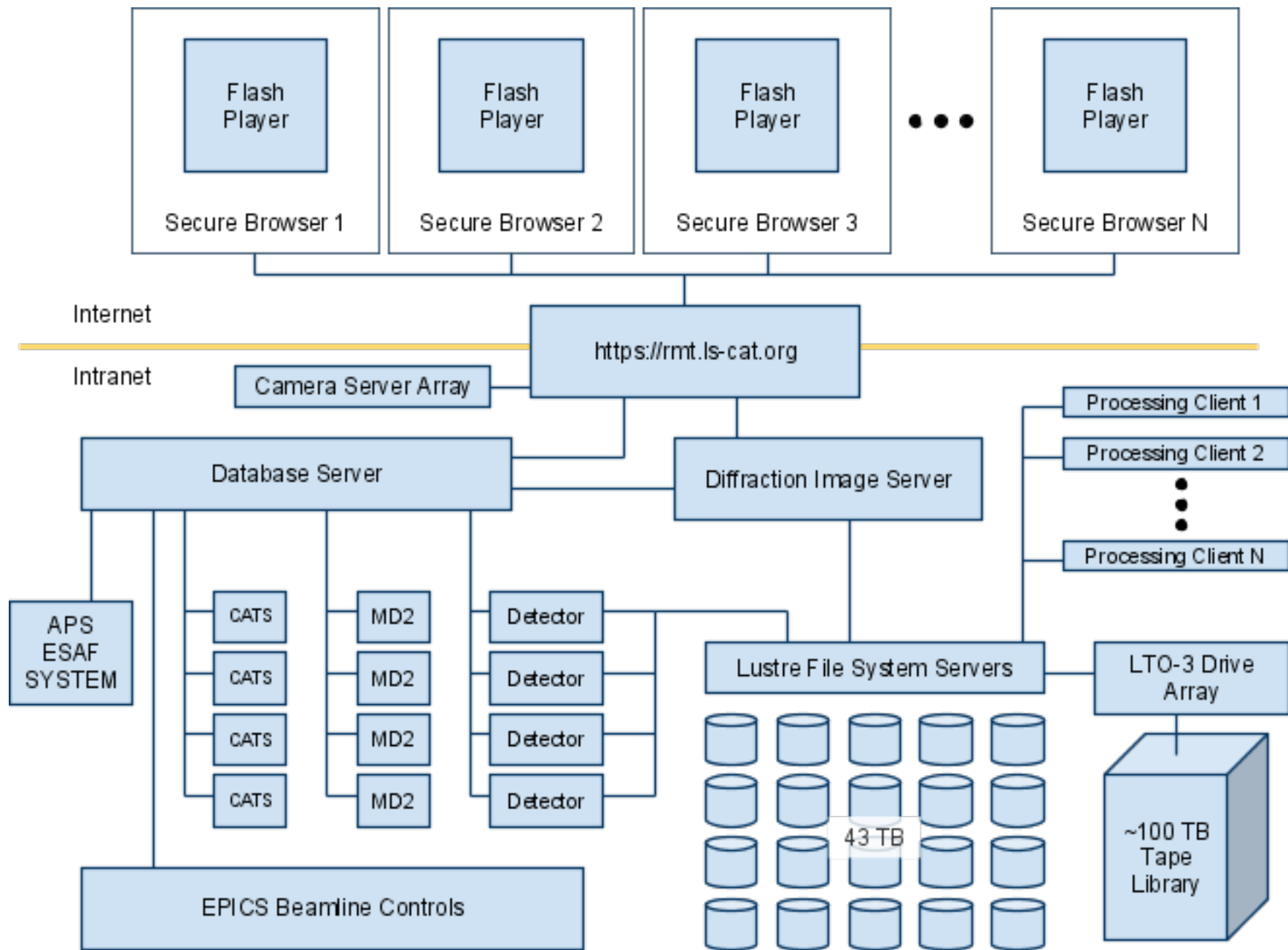
Zdzislaw Wawrzak







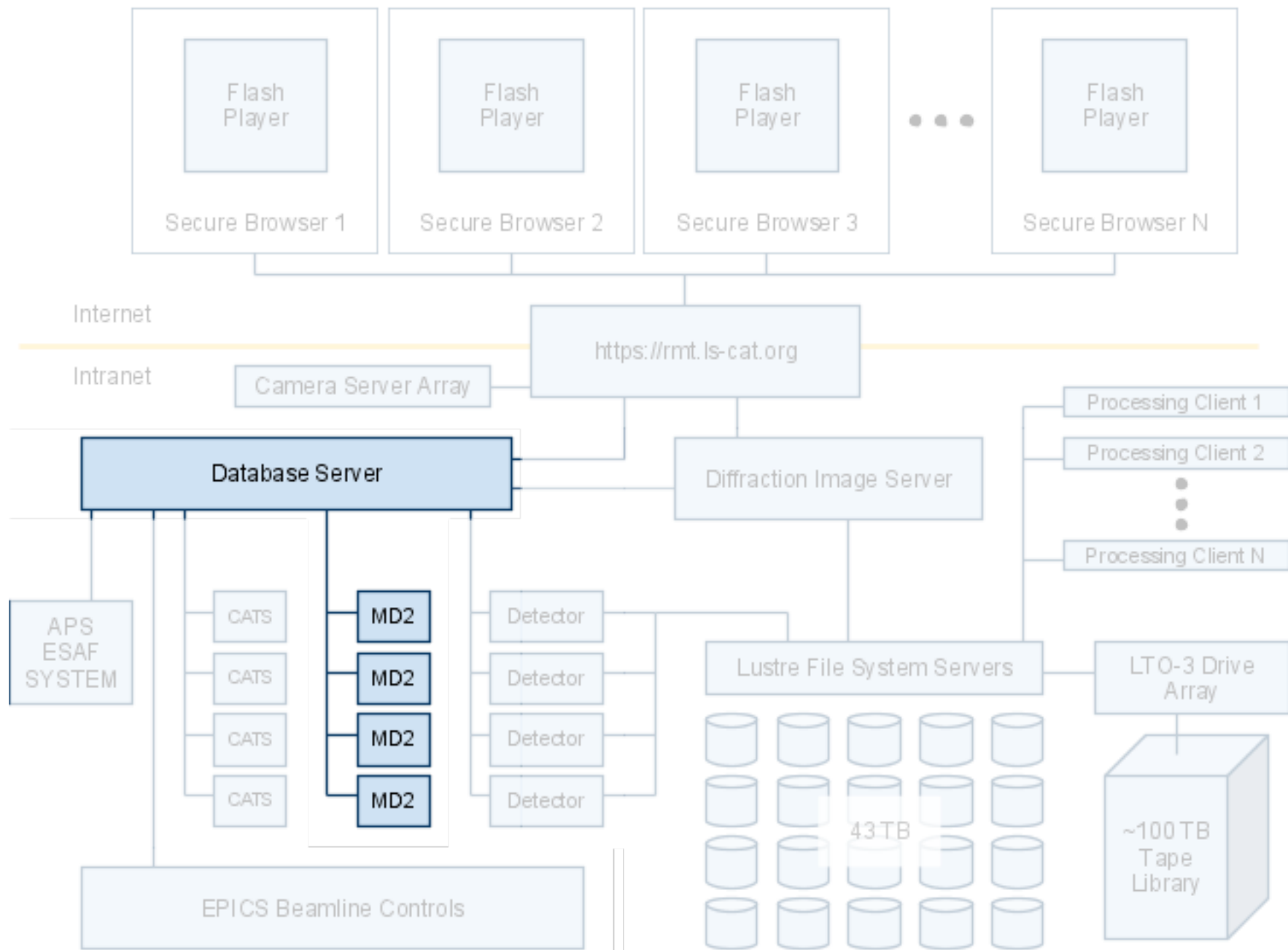




# LS-CAT Computing Architecture

Keith Brister, TWG, November 19, 2009





# LS-CAT Computing Architecture


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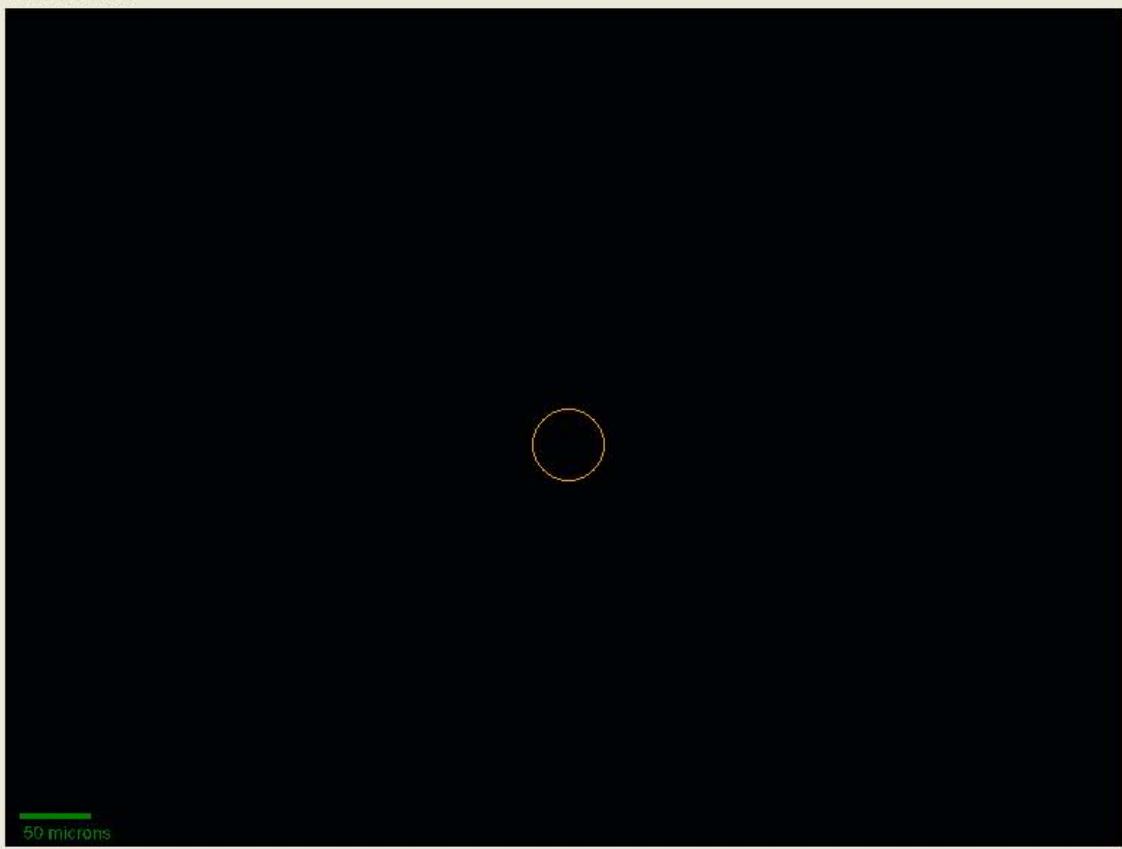
**Micro-Diffractometer**

File Options Devices Tools Diagnostic LSCAT Help


**Monitoring Camera**



**Sample Camera**

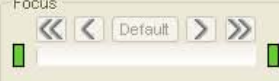


**Tools**




**Focus**

Default



**Zoom**


5



**Light**

Back (%)

Front (%)



**Phase Selection**

**Sample Transfer**

**Sample Centring**

**Data Collection**

**Beam Location**

**Fast Shutter**

Closed

Open / Close

**Scintillator focus**

Tune...

**Scintillator/Photodiode**

Photodiode

Scintillator

Cover

**Capillary/Beamstop**

Tune...

In

Out

Cover

**Aperture**

Tune...

In

Out

Cover

**Beam Mark**

Shape

Circle

Square

Size

Horizontal (microns) 50

Vertical (microns) 50

Position

Default

Reset

READY Ready to drag the beam mark on the beam position

ADMIN

Keith Brister, TWG, November 19, 2009







**Micro-Diffractometer**

File Options Devices Tools Diagnostic LSCAT Help

**Monitoring Camera**



**Sample Camera**




**Tools**




**Focus**

Default



**Zoom**

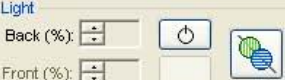
5



**Light**

Back (%)

Front (%)



**Phase Selection**

**Sample Transfer**

**Sample Centring**

**Data Collection**

**Beam Location**

**Fast Shutter**

Open

Open / Close

**Scintillator focus**

Tune...

**Scintillator/Photodiode**

Photodiode

Scintillator

Cover

**Capillary/Beamstop**

Tune...

In

Out

Cover

**Aperture**

Tune...

In

Out

Cover

**Beam Mark**

Shape

Circle

Square

Size

Horizontal (microns) 50

Vertical (microns) 50

Position

Default

Reset

READY Software is waiting for commands. Hardware is ready.

ADMIN

Keith Brister, TWG, November 19, 2009







**Micro-Diffractometer**

File Options Devices Tools Diagnostic LSCAT Help


**Monitoring Camera**



**Sample Camera**

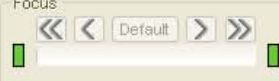


**Tools**




**Focus**

Default



**Zoom**


5



**Light**

Back (%)

Front (%)



**Phase Selection**

**Sample Transfer**

**Sample Centring**

**Data Collection**

**Beam Location**

**Fast Shutter**

Open

Open / Close

**Scintillator focus**

Tune...

**Scintillator/Photodiode**

Photodiode

Scintillator

Cover

**Capillary/Beamstop**

Tune...

In

Out

Cover

**Aperture**

Tune...

In

Out

Cover

**Beam Mark**

Shape

Circle

Square

Size

Horizontal (microns) 50

Vertical (microns) 50

Position

Default

Reset

READY Ready to drag the beam mark on the beam position

ADMIN


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**Micro-Diffractometer**

File Options Devices Tools Diagnostic LSCAT Help


**Monitoring Camera**



**Sample Camera**



**Tools**



**Focus**

Default

**Zoom**

5

**Light**

Back (%):

Front (%):

**Phase Selection**

**Sample Transfer**

**Sample Centring**

**Data Collection**

**Beam Location**

**Fast Shutter**

Open

Open / Close

**Scintillator focus**

Tune...

**Scintillator/Photodiode**

Photodiode

Scintillator

Cover

**Capillary/Beamstop**

Tune...

In

Out

Cover

**Aperture**

Tune...

In

Out

Cover

**Beam Mark**

**Shape**

Circle

Square

**Size**

Horizontal (microns): 50

Vertical (microns): 50

**Position**

Default

MD2 Control | LSCAT Control | Log of Events | User Feedback

Reset | **READY** | Ready to drag the beam mark on the beam position

ADMIN


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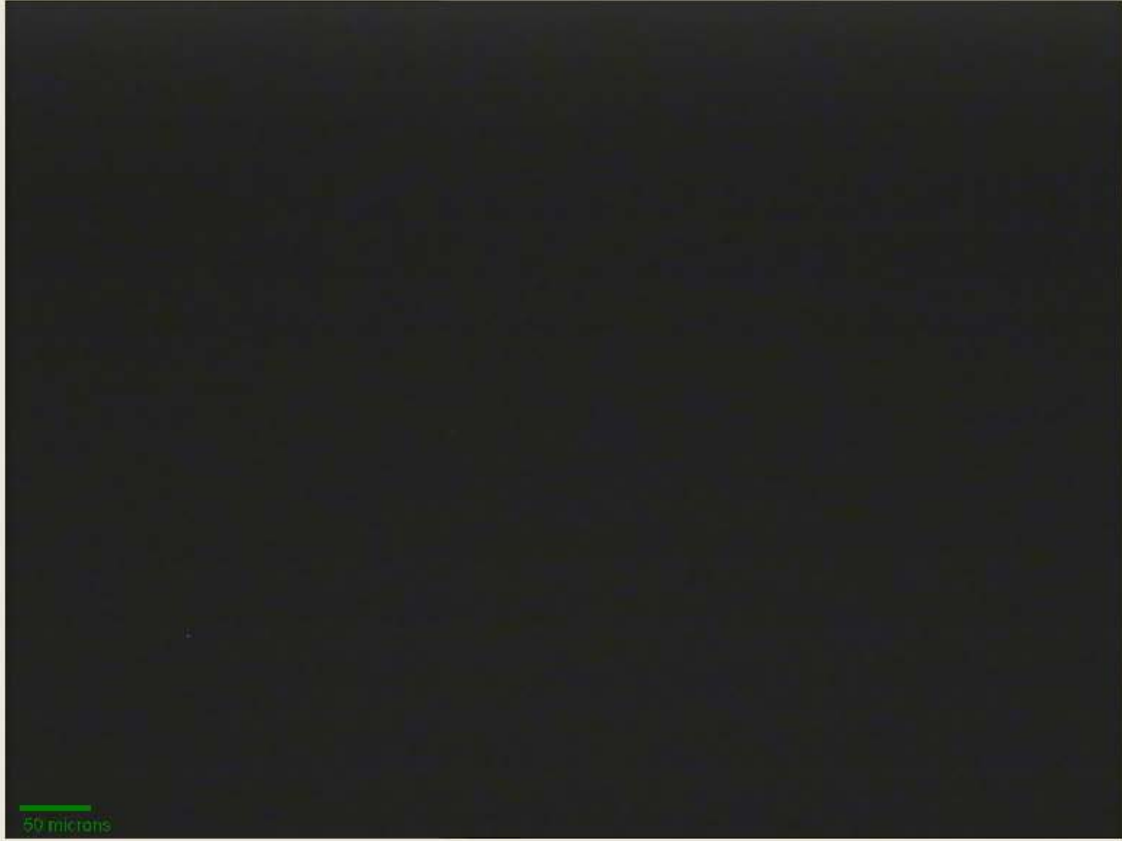
**Micro-Diffractometer**

File Options Devices Tools Diagnostic LSCAT Help


**Monitoring Camera**



**Sample Camera**

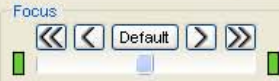


**Tools**




**Focus**

Default



**Zoom**


5



**Light**

Back (%):

Front (%):



**Phase Selection**

Sample Transfer

Sample Centring

Data Collection

Beam Location

**Station 21-ID-F**

**Mounted Sample**

Station: 21-ID-F

Dewar: SPiNE Dewar 1


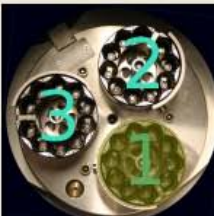

Puck: SPiNE Basket 1


Sample: Sample 01

**Dewar** SPiNE Dewar 1

**Puck** SPiNE Basket 1

**Sample** Sample 06 63176



Sample 06  
ESAF: 67378  
Empty Loop 6

Log Off

Mount

Dismount

MD2 Control

LSCAT Control

Log of Events

User Feedback

Reset

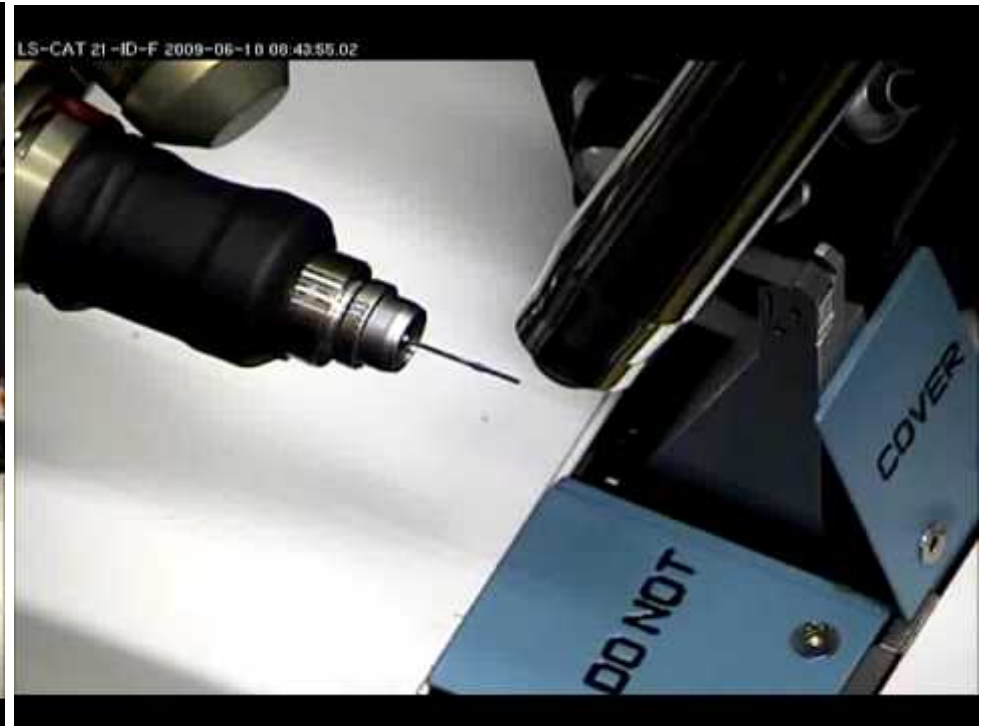
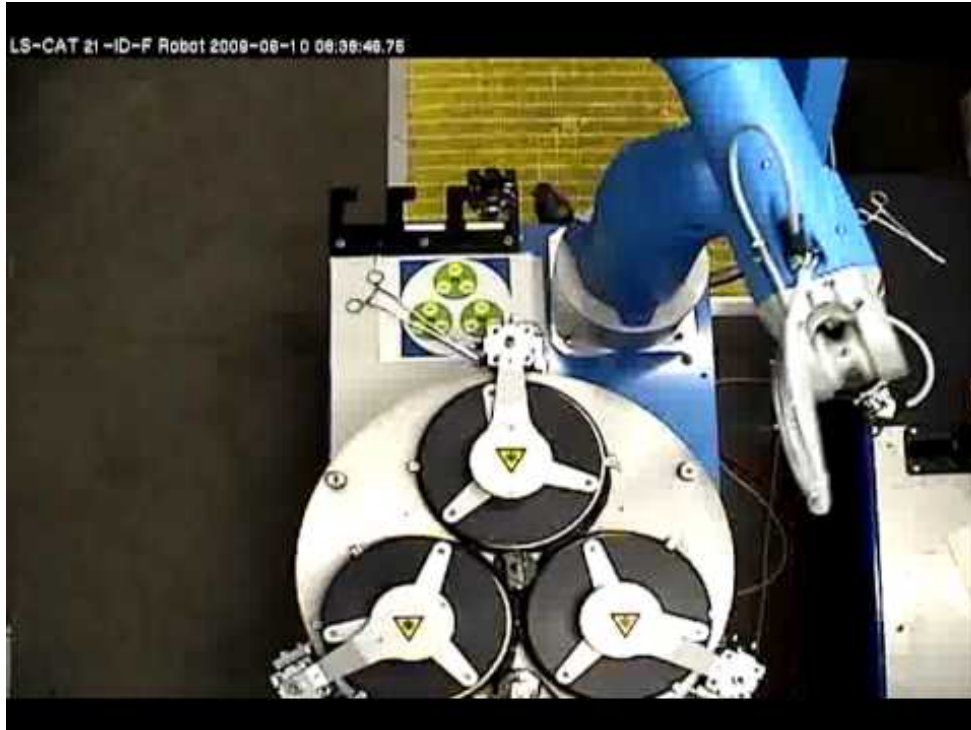
READY

Waiting sample transfer on Data Collection Axis. Click "Sample Centring" when ready.

ADMIN










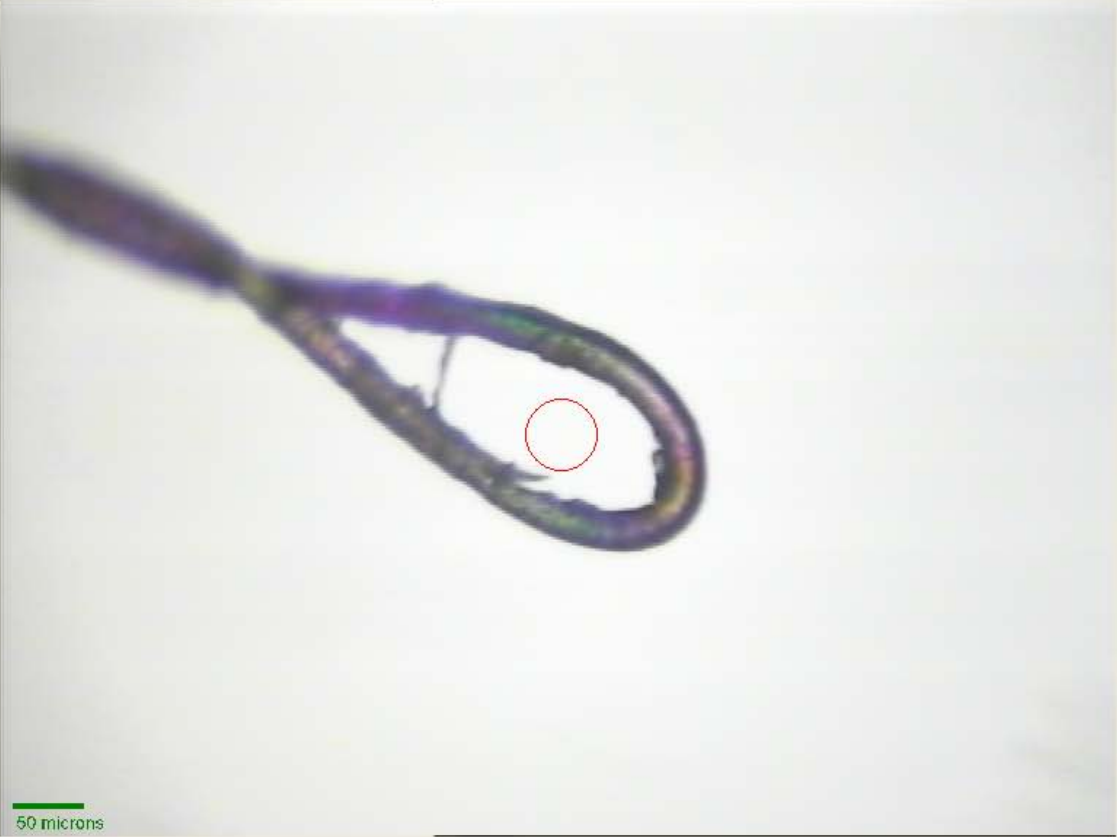
**Micro-Diffractometer**


File Options Devices Tools Diagnostic LSCAT Help

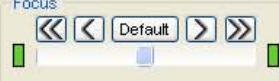
**Monitoring Camera**




**Sample Camera**



**Tools** 

**Focus** 

**Zoom** 

**Light** Back (%):  Front (%):

**Phase Selection**


Sample Transfer

Sample Centring

Data Collection

Beam Location

**Computer-Aided Centring**

+ 3 Clicks 

```

000.7 Click on the point you want to center
001.1 X=388, Y=314
001.2 Click again on the point you want to center
003.5 X=387, Y=341
003.6 Click on the point you want to align
006.2 X=384, Y=275
007.3 Centring terminated
          
```

**Alignment Horizontal translation**

**MiniKappa**

Rotations...

**Manual Centring**

Centring Vertical Translation...

**Data Collection Axis (Omega) rotation**

Jog speed (deg/sec):

Rotate Stop

-90 +90 -180 +180

MD2 Control LSCAT Control Log of Events User Feedback

Reset READY Click one of the Centring buttons to move the sample on the rotation axis ADMIN


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Micro-Diffractometer

File Options Devices Tools Diagnostic LSCAT Help


**Monitoring Camera**

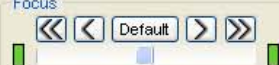



**Sample Camera**




50 microns

Tools: 

Focus: 

Zoom:  

Light: Back (%):  Front (%):  

**Phase Selection**

Sample Transfer

Sample Centring

Data Collection

Beam Location

63176  
D1 P1 S1

Log Off

Prefix	Status	ETC

**Current Values**

$\Omega$ : 91.104

K: 0

$\Phi$ : 0

D: 150.0

$\lambda$ : 0.97872

I/C

**Sample Settings**

Distance: 150 mm

Time: 1 sec

Frames/Wedge

Frames: 100 Delta: 1

Start: 90 End: 190

File Name	Start	Status	Frame
e_S.001	90	Done	1
e_S.002	90	Done	2
e.001	90	HotTak...	1
e.002	91	HotTak...	2
e.003	92	HotTak...	3
e.004	93	HotTak...	4
e.005	94	HotTak...	5
e.006	95	HotTak...	6

More... Snap Ortho Snap Run

MD2 Control LSCAT Control Log of Events User Feedback

Reset READY Software is busy. Hardware is ready. ADMIN


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Micro-Diffractometer

File Options Devices Tools Diagnostic LSCAT Help


**Monitoring Camera**



**Sample Camera**

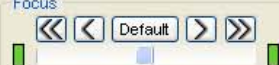


Tools




Focus

Default



Zoom


5



Light

Back (%)

Front (%)



**Phase Selection**

Sample Transfer

Sample Centring

Data Collection

Beam Location

63176

D1 P1 S1

Log Off

Prefix	Status	ETC

**Current Values**

$\Omega$ : 91.104

K: 0

$\Phi$ : 0

D: 150.0

$\lambda$ : 0.97872

I/C

**Sample Settings**

Directory: f.kb090610

Prefix: e

Dewar: SPINE Dewar 1

Puck: SPINE Basket 1

Sample: Sample 01

Visual

File Name	Start	Status	Frame
e_S.001	90	Done	1
e_S.002	90	Done	2
e.001	90	HotTak...	1
e.002	91	HotTak...	2
e.003	92	HotTak...	3
e.004	93	HotTak...	4
e.005	94	HotTak...	5
e.006	95	HotTak...	6

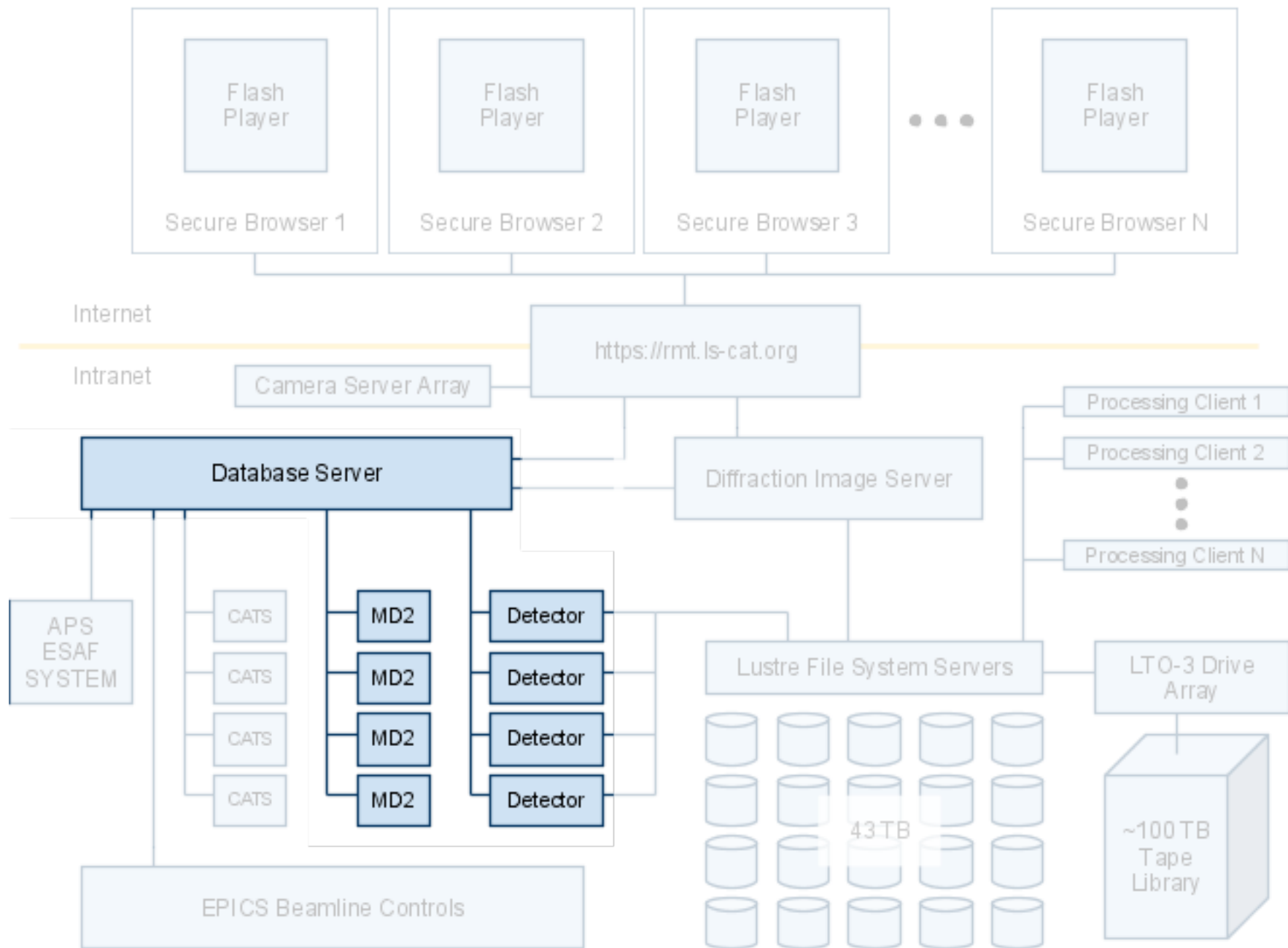
More... Snap Ortho Snap Run

MD2 Control LSCAT Control Log of Events User Feedback

Reset READY Software is busy. Hardware is ready. ADMIN

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# LS-CAT Computing Architecture

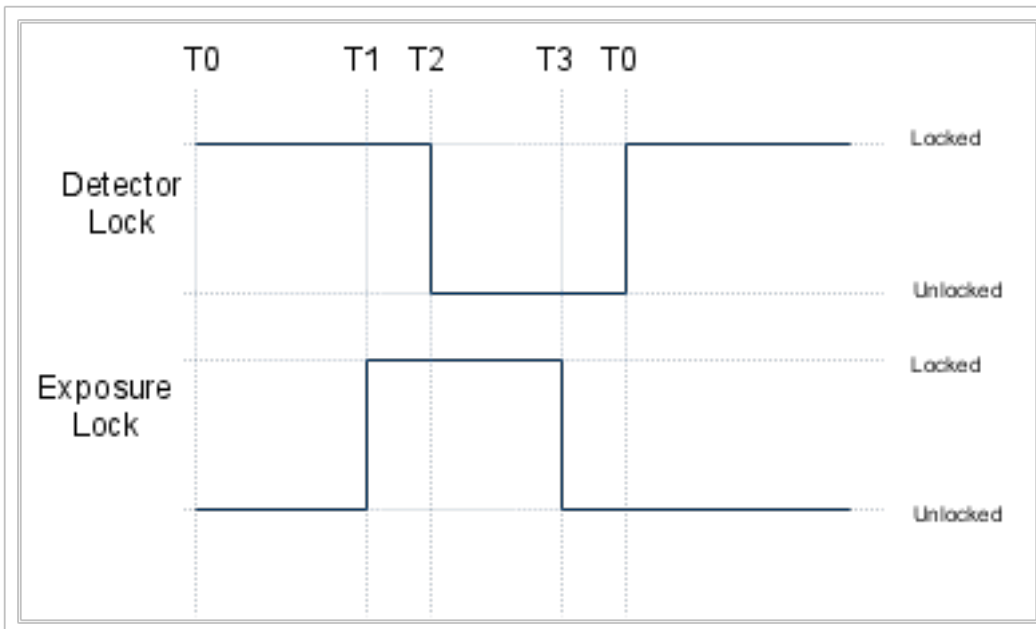
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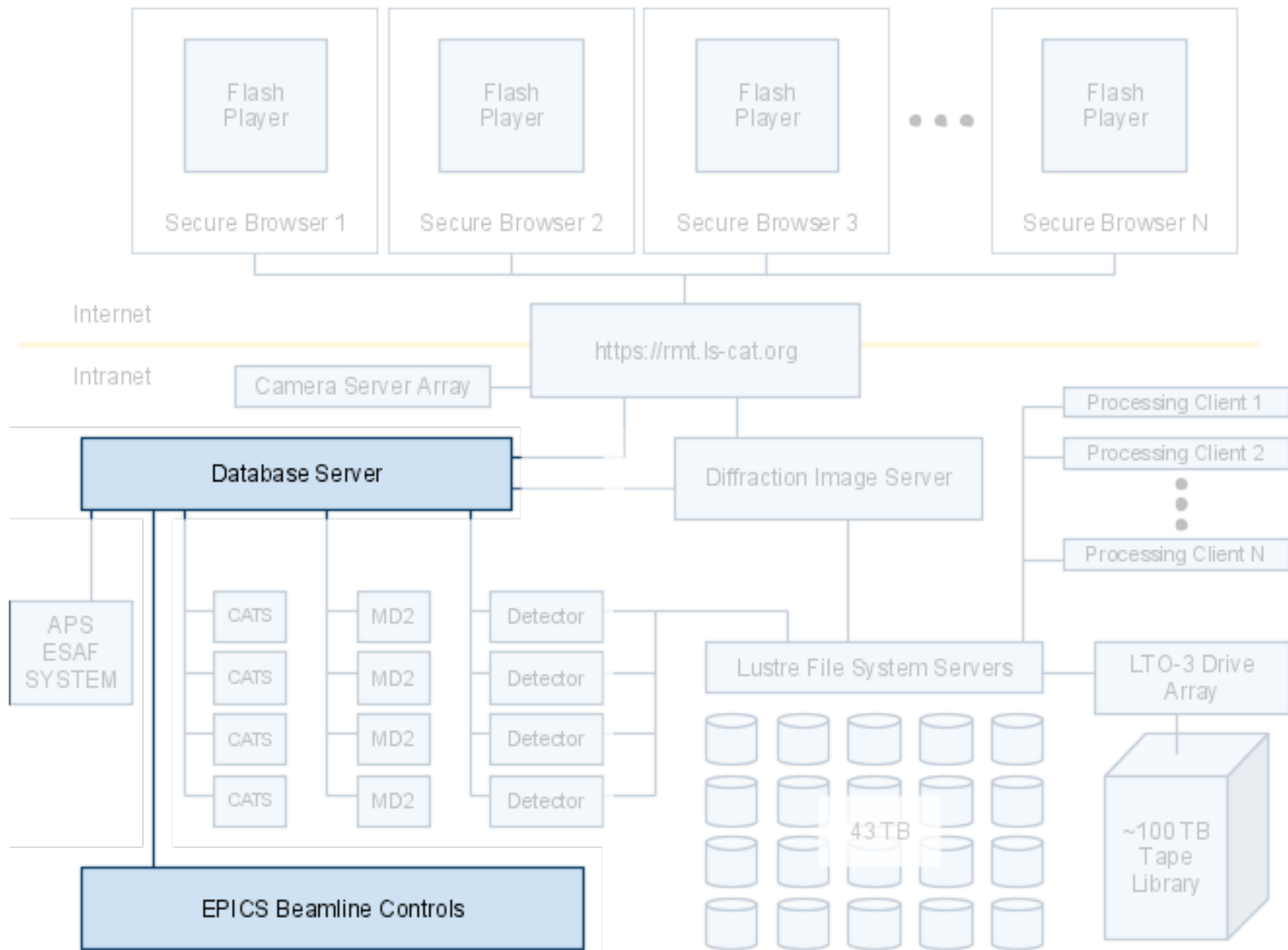
# Detector Control Using Postgresql Locks

- Database locks provide an easy way to enforce timing constraints
- Only 1 database client may own a given lock at a given time
- Lock requests are atomic: we are guaranteed that at no time, however short, will a lock be owned by more than one process
- Lock requests may be made with blocking calls
- Otherwise similar to a mutex, database locks work across the network allowing multiple machines to run synchronously



T0	Detector Ready
T1	Start Integration
T2	Integration Started
T3	Exposure Finished



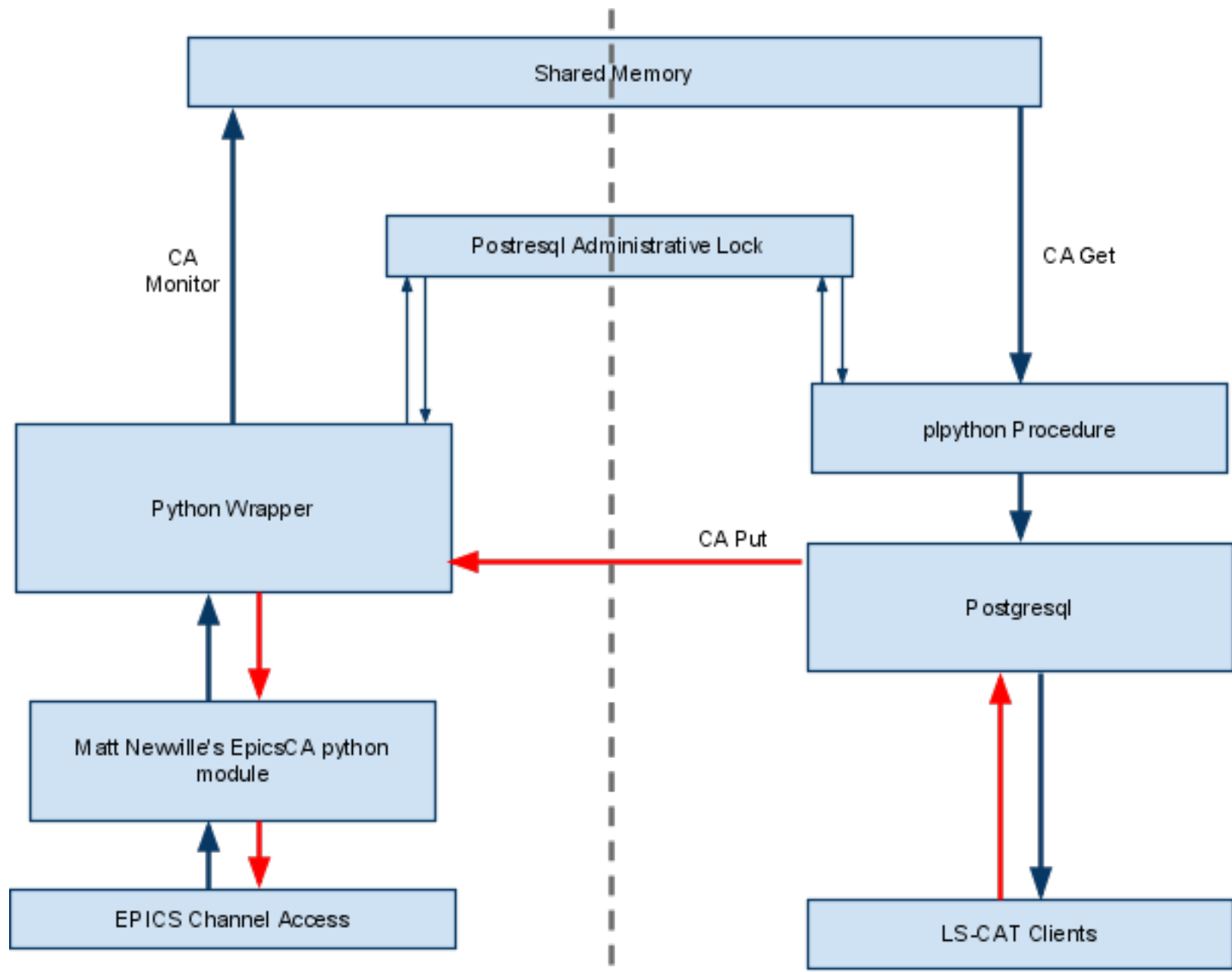


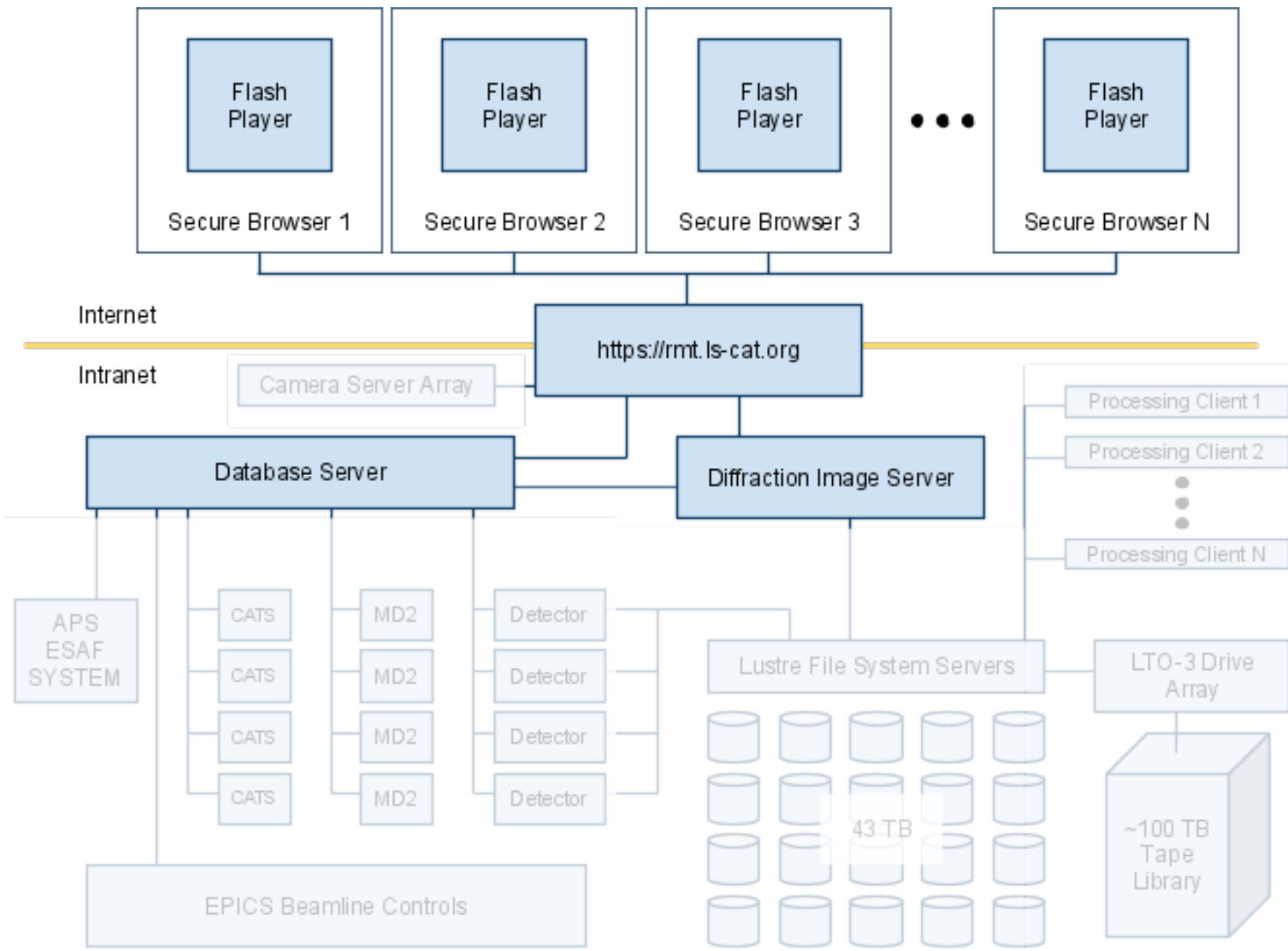
# LS-CAT Computing Architecture

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# EPICS-Postgresql Asynchronous Connector



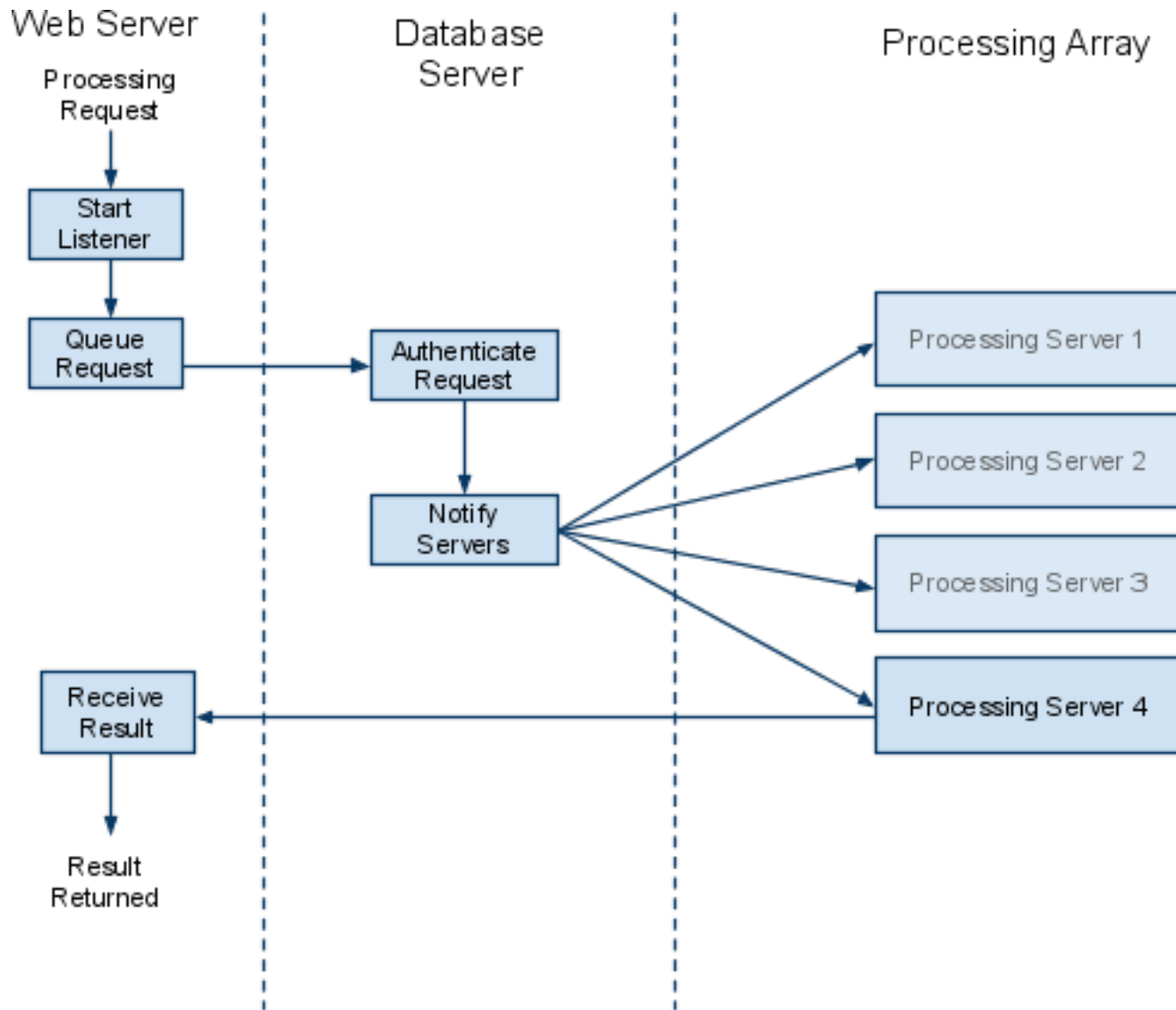


# LS-CAT Computing Architecture

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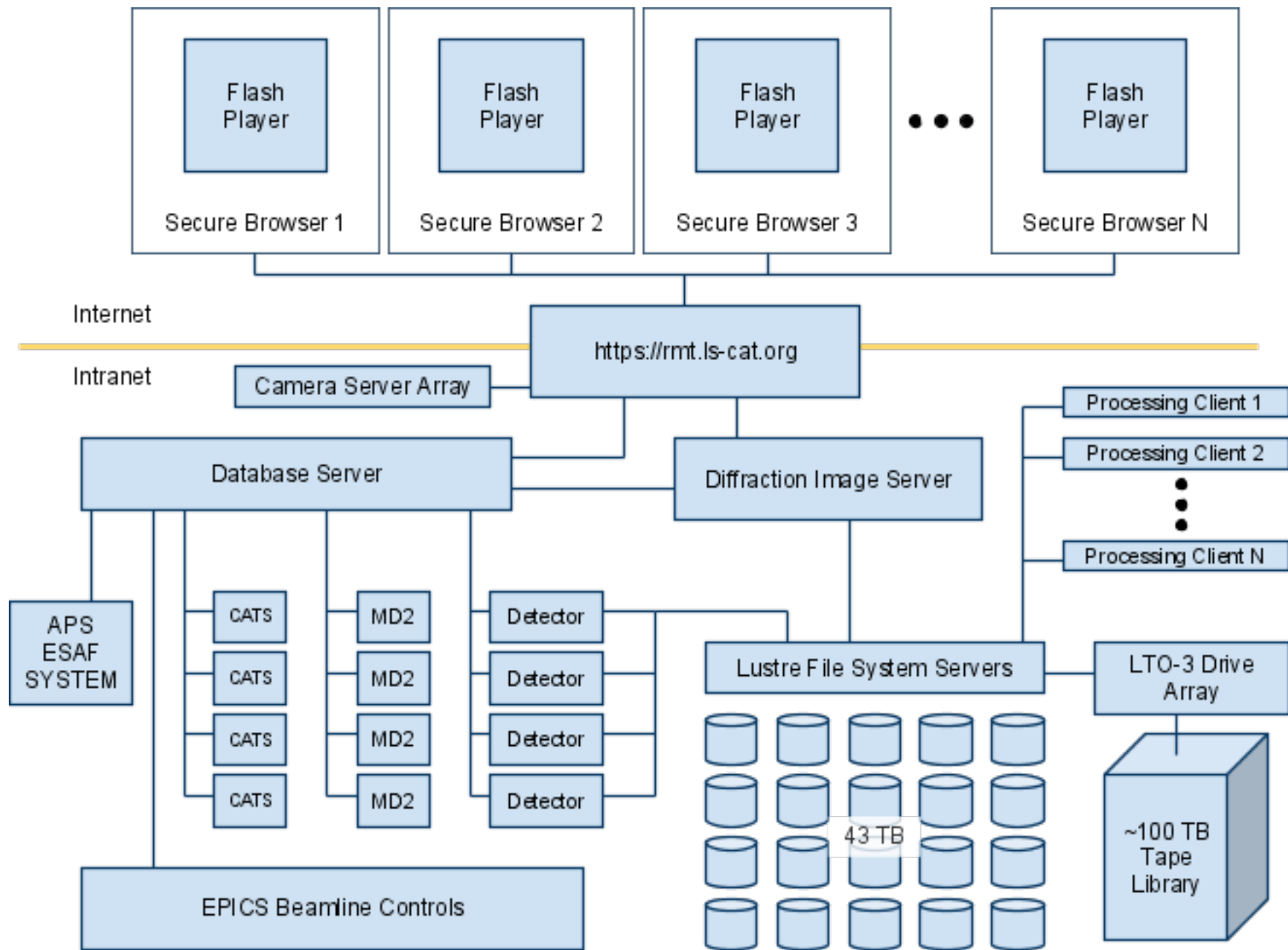


Requests can be anything requiring access to the raw images that results in a single stream of data.

All processing servers are notified of every request, the first to respond gets the work.

Since all processing servers share the same file system, it's possible to implement predictive processing.





# LS-CAT Computing Architecture

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**LS-CAT Remote Access Password and User Name**

Use this form to request an initial password, change your password, or change your user ID.

If you have forgotten your password you may request that a new random password be sent to you by pressing the Reset Password button.

**Note:** Only those who appear with their correct email address and APS badge number on a recently approved LS-CAT Experiment Safety Assessment Form are eligible for LS-CAT remote access accounts.

**New users**  
Enter your badge number and your email address then press the Reset Password button.

APS Badge Number: \*  [How do I find this?](#)

Email Address: \*

Password:

**Change or Reset Password**

|

**User Name**

User Name:

- Access to the LS-CAT remote interface is determined by an approved ESAF.
- A random password that meets both ANL and Northwestern guidelines is emailed to the user.
- Both the badge number and the corresponding email address must be listed on a recent LS-CAT ESAF.

If you follow the rules for submitting an ESAF, access is easy and does not require staff effort beyond approving the ESAF.



LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View Cameras MD2

Fullscreen Logoff About

ESAF: 65606 Brister

Current Status

Directory Browser

Search:  Clear

- d
  - 100709
  - 110109
  - al\_101209
  - alumina
  - bc\_111309
  - bc\_calibr-100709
  - jsb\_11\_04\_2009\_21idd
  - jsb\_11\_04\_2009\_21iddcolle
    - fur1
      - fur1
      - fur1\_A.001
      - fur1\_A.002
      - fur1\_A.003
      - fur1\_A.004
      - fur1\_A.005
      - fur1\_A.006
      - fur1\_A.007
      - fur1\_A.008
      - fur1\_A.009
      - fur1\_A.010
      - fur1\_A.011
      - fur1\_A.012
      - fur1\_A.013
      - fur1\_A.014
      - fur1\_A.015
      - fur1\_A.016
      - fur1\_A.017
      - fur1\_A.018
      - fur1\_A.019
      - fur1\_A.020
      - fur1\_B.001
      - fur1\_B.002
      - fur1\_B.003

Image: d/jsb\_11\_04\_2009\_21iddcollect/fur1/fur1\_A.004

Info Res 5.44Å

Pan Profile Index Save

Transferring data from rmt.ls-cat.org...

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LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View Cameras MD2

Fullscreen Logoff About

ESAF: 65606 Brister

Current Status

Directory Browser

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  - 100709
  - 110109
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  - bc\_calibr-100709
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      - fur1\_A.002
      - fur1\_A.003
      - fur1\_A.004
      - fur1\_A.005
      - fur1\_A.006
      - fur1\_A.007
      - fur1\_A.008
      - fur1\_A.009
      - fur1\_A.010
      - fur1\_A.011
      - fur1\_A.012
      - fur1\_A.013
      - fur1\_A.014
      - fur1\_A.015
      - fur1\_A.016
      - fur1\_A.017
      - fur1\_A.018
      - fur1\_A.019
      - fur1\_A.020
      - fur1\_B.001
      - fur1\_B.002
      - fur1\_B.003

Image: d/jsb\_11\_04\_2009\_21iddcollect/fur1/fur1\_A.004

Info Res 3.57Å

Pan Profile Index Save

Transferring data from rmt.ls-cat.org...

Keith Brister, TWG, November 19, 2009



LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View Cameras MD2 Fullscreen Logoff About

ESAF: 65606 Brister

Current Status

Directory Browser

Search:  Clear

- d
  - 100709
  - 110109
  - al\_101209
  - alumina
  - bc\_111309
  - bc\_calibr-100709
  - jsb\_11\_04\_2009\_21idd
  - jsb\_11\_04\_2009\_21iddcolle
    - fur1
      - fur1
      - fur1\_A.001
      - fur1\_A.002
      - fur1\_A.003
      - fur1\_A.004
      - fur1\_A.005
      - fur1\_A.006
      - fur1\_A.007
      - fur1\_A.008
      - fur1\_A.009
      - fur1\_A.010
      - fur1\_A.011
      - fur1\_A.012
      - fur1\_A.013
      - fur1\_A.014
      - fur1\_A.015
      - fur1\_A.016
      - fur1\_A.017
      - fur1\_A.018
      - fur1\_A.019
      - fur1\_A.020
      - fur1\_B.001
      - fur1\_B.002
      - fur1\_B.003

Image: d/jsb\_11\_04\_2009\_21iddcollect/fur1/fur1\_A.004

Info Res 3.57Å

Pan Profile Index Save

Waiting for rmt.ls-cat.org...

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LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View Cameras MD2

Fullscreen Logoff About

ESAF: 65606 Brister

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  - 100709
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  - bc\_calibr-100709
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    - fur1
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      - fur1\_A.002
      - fur1\_A.003
      - fur1\_A.004
      - fur1\_A.005
      - fur1\_A.006
      - fur1\_A.007
      - fur1\_A.008
      - fur1\_A.009
      - fur1\_A.010
      - fur1\_A.011
      - fur1\_A.012
      - fur1\_A.013
      - fur1\_A.014
      - fur1\_A.015
      - fur1\_A.016
      - fur1\_A.017
      - fur1\_A.018
      - fur1\_A.019
      - fur1\_A.020
      - fur1\_B.001
      - fur1\_B.002
      - fur1\_B.003

Image: d/jsb\_11\_04\_2009\_21iddcollect/fur1/fur1\_A.004

Info Res 3.57Å

Intensity Profile

Width: 3

Min: 102  
Avg: 739  
Max: 1464

Pan Profile Index Save

Transferring data from rmt.ls-cat.org...

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LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View Cameras MD2

Fullscreen Logoff About

ESAF: 65606 Brister

Current Status

Follow

21-ID-D  
d/bc\_111309/bc18\_1\_S.002

21-ID-F  
f/test/11-17-09/default\_S.001

21-ID-G  
g/test/1118test\_S.001

Image: f/test/11-17-09/default\_S.001

Info Res 9.10Å

Exp. Time: 1 sec  
Start Angle: 0 deg  
OWidth: 1 deg  
Num Saturated Pix: 0

Directory Browser

Pan Profile Index Save

Waiting for rmt.ls-cat.org...

Keith Brister, TWG, November 19, 2009





LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View **Cameras** MD2

Fullscreen Logoff About

Server	Camera	Location
04	1	21-ID Roaming #4
05	1	21-ID Roaming #5
06	1	21-ID-C Kohzu Temperatures
07	1	21-ID-G Sample
07	2	21-ID-G Overview
07	3	21-ID-G Users
07	4	21-ID-G Screen
07	quad	21-ID-G Quad
08	1	21-ID-D Ceiling
09	1	21-ID-B F Mono
10	1	21-ID-B F Upstream of Lens
11	1	21-ID-B G Mono
12	1	21-ID-B G Upstream of Lens
13	1	21-ID Roaming #13
14	1	21-ID Roaming #14
15	1	21-ID-F Ceiling
16	1	21-ID-G Ceiling
17	1	21-ID-E Ceiling
18	1	21-ID-E Robot
19	1	21-ID-E Sample
19	2	21-ID-E Overview
19	3	21-ID-E Users
19	4	21-ID-E Screen
19	quad	21-ID-E Quad
20	1	21-ID-F Sample
20	2	21-ID-F Overview
20	3	21-ID-F Users
20	4	21-ID-F Screen
20	quad	21-ID-F Quad
21	1	21-ID-D Sample
21	2	21-ID-D Overview
21	3	21-ID-D Users
21	4	21-ID-D Screen
21	quad	21-ID-D Quad
23	1	21-ID-G Robot
24	1	21-ID-F Robot
25	1	21-ID-D Robot

Status: playing Mode: Aspect

LS-CAT 21-ID-F Overview 2009-11-18 09:16:06.37

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LS-CAT Remote Access

ls-cat.org https://ls-cat.org/lrmt.html#

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LS-CAT Remote Access

Data View Cameras MD2 Fullscreen Logoff About

Data Cameras

Sample playing

Robot playing

Users playing

Screen playing

LS-CAT 21-ID-F Sample 2009-11-18 13:47:37.65

Camera: 21-ID-F Sample State: playing

Esaf: 67221 Station: 21-ID-F

Prefix	Status	ETC	More

**Current Values**

$\Omega$ : 210.551  
 $K$ : 0  
 $\Phi$ : 337.68  
 $D$ : 635.1  
 $\lambda$ : 0.97872  
I/C: Unknown

**Collection Parameters**

Directory: f/ryan  
Prefix: J14a  
 Wedge  
Frames: 350 Delta: 0.5  
Start: 30 End: 205.0

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LS-CAT Remote Access

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LS-CAT Remote Access

Data View Cameras MD2

Fullscreen Logoff About

Data Cameras

Image: gg2j\_S.009 Info Res 3.68Å

Pan Profile Index Save

Esaf: 67221 Station: 21-ID-F

Prefix	Status	ETC	More

**Current Values**

$\Omega$ : 60.604  
 $K$ : 0  
 $\Phi$ : 217.68  
 $D$ : 250.0  
 $\lambda$ : 0.97872  
I/C: Unknown

**Collection Parameters**

Directory: f/ryan  
Prefix: J14a  
 Wedge  
Frames: 350 Delta: 0.5  
Start: 30 End: 205.0

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# To Do

Lots:

- Remote centering tool
- Remote sample changing
- Auto centering tools
- Data processing tools
- Rsync (protocol initiated from our servers)
- Rsync (protocol initiated from users' servers)
- Beam alignment tools
- Mail-in user support

