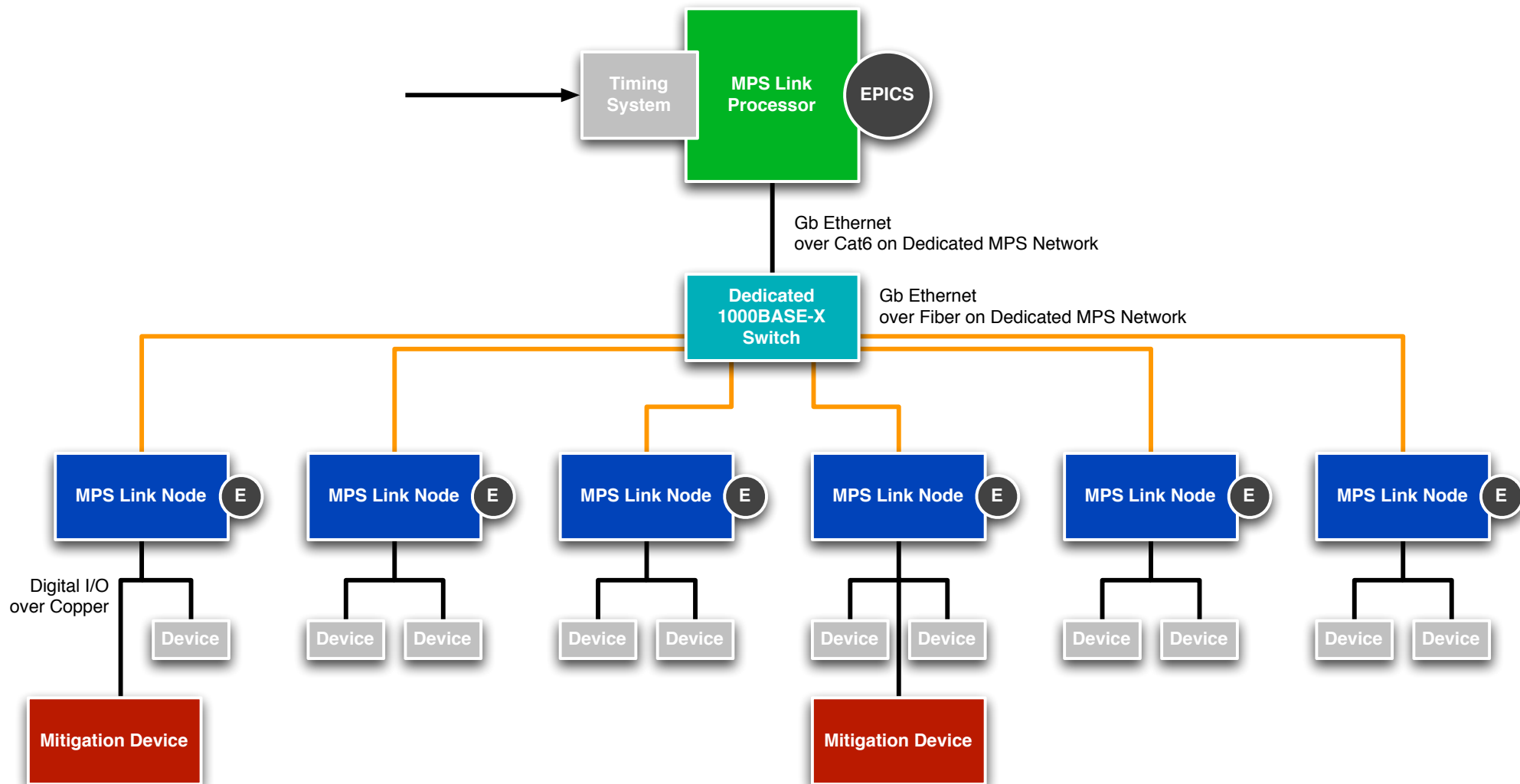


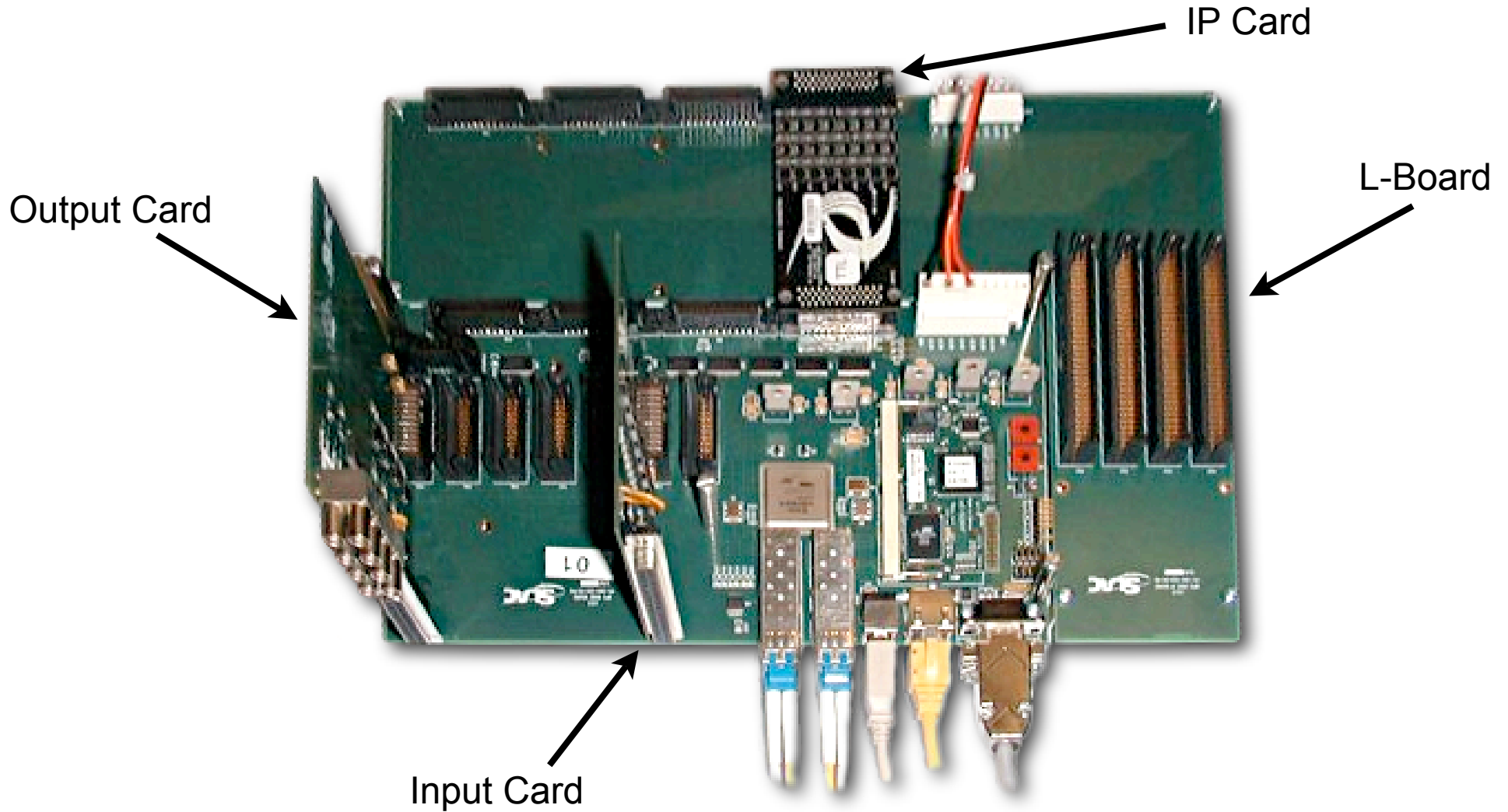
# LCLS Machine Protection System

- System Overview
- Completed Work
- Remaining Work
- Schedule

# LCLS MPS Overview



# MPS Link Node



## MPS Software

### ■ Four software projects

#### ■ Link Processor

- MVME 6100 IOC software

#### ■ Link Node

- FPGA firmware
- ColdFire IOC software

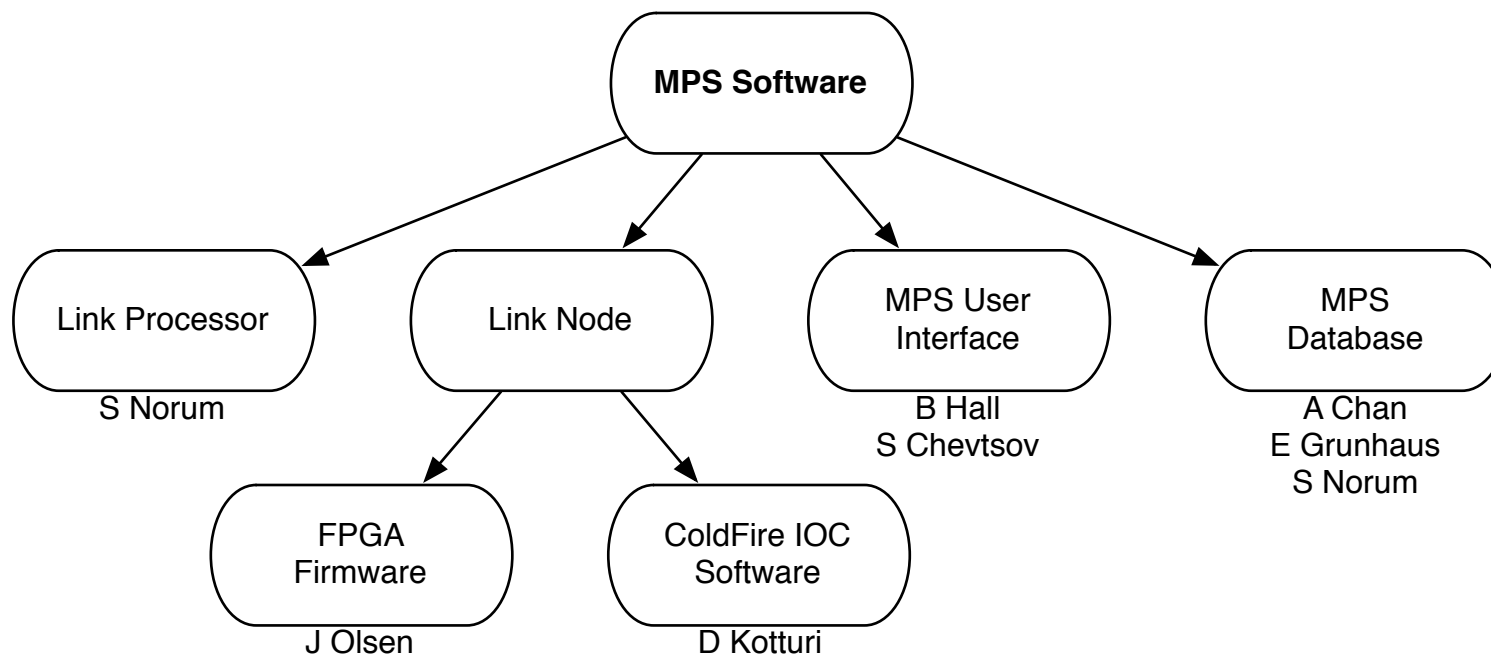
#### ■ MPS User Interface

- Desktop computer

#### ■ MPS Database

- Database

# MPS Software



# Link Processor

- Remaining
  - Testing
  - BLM/PIC Integration
  - Final Algorithm

## Link Node

### ■ Remaining

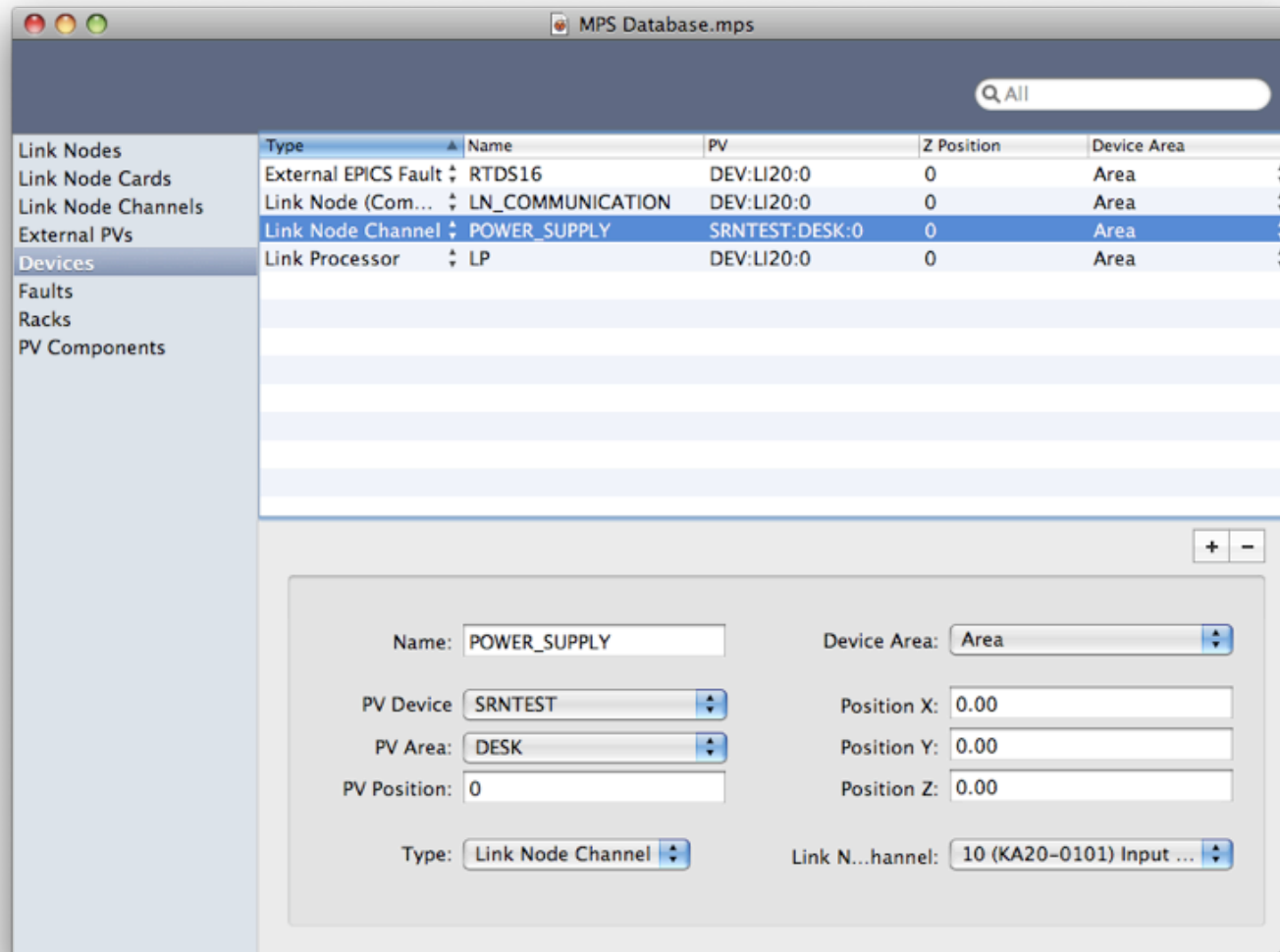
#### ■ John Dusatko

- PIC/BLM QINT ADC

#### ■ Jeff Olsen

- BYKIK Faults
- QADC System Integration

# MPS Database



The screenshot shows the 'MPS Database.mps' application window. It features a search bar at the top right with the text 'All'. On the left is a sidebar with a tree view containing categories: Link Nodes, Link Node Cards, Link Node Channels, External PVs, Devices, Faults, Racks, and PV Components. The main area displays a table with the following data:

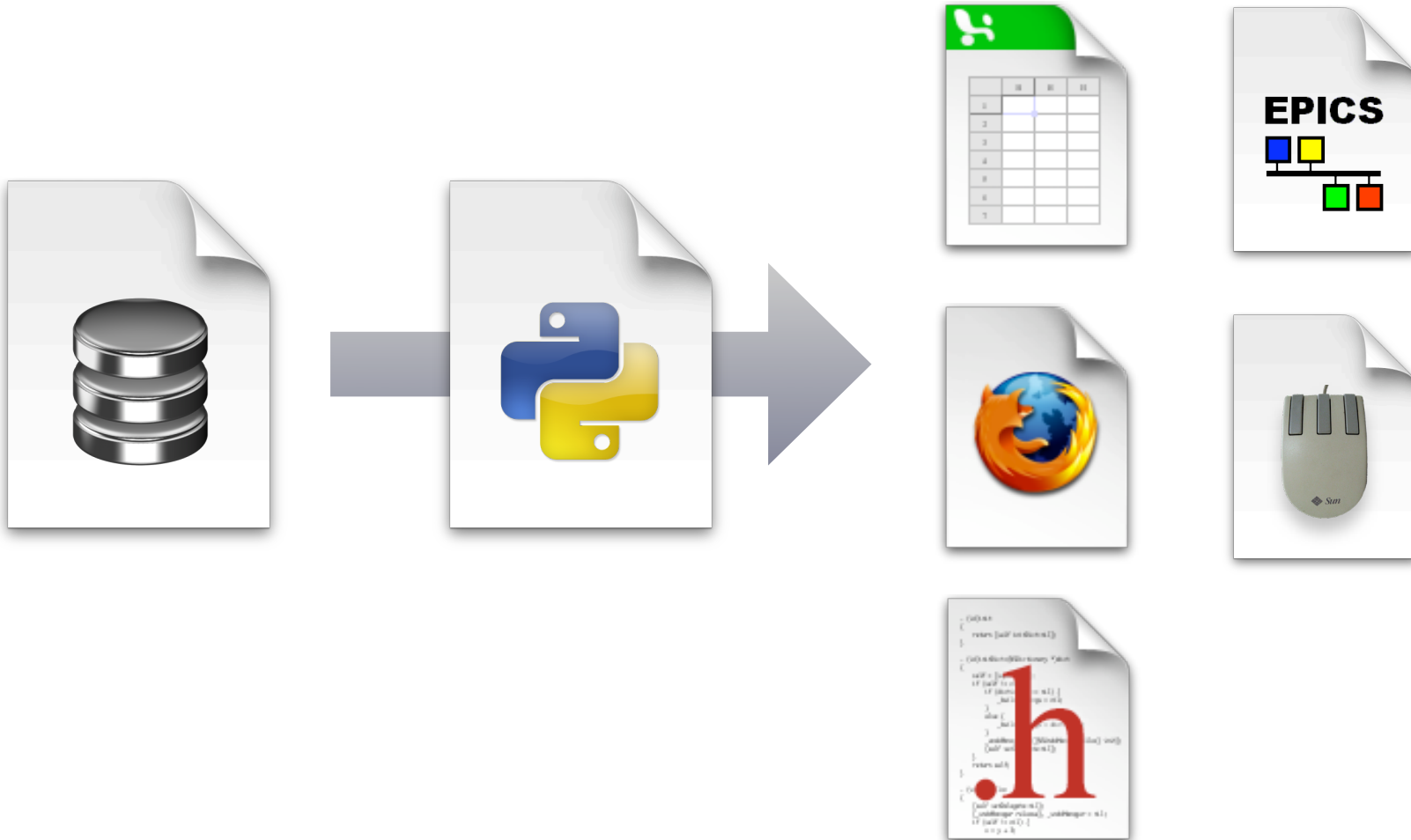
Type	Name	PV	Z Position	Device Area
External EPICS Fault	RTDS16	DEV:LI20:0	0	Area
Link Node (Com...)	LN_COMMUNICATION	DEV:LI20:0	0	Area
Link Node Channel	POWER_SUPPLY	SRNTEST:DESK:0	0	Area
Link Processor	LP	DEV:LI20:0	0	Area

Below the table is a configuration panel with the following fields:

- Name: POWER\_SUPPLY
- Device Area: Area
- PV Device: SRNTEST
- Position X: 0.00
- PV Area: DESK
- Position Y: 0.00
- PV Position: 0
- Position Z: 0.00
- Type: Link Node Channel
- Link N...hannel: 10 (KA20-0101) Input ...



# MPS Database



# Link Node ColdFire User Interface

MPS Link Node MP10

LCLS MPS Link Node:  
EIOC:IN20:MP10

Flash environment variables

Factory: **Arcturus Networks, Inc.**

Revision: **uC3202 Rev 1.0 4MB 5MB**

Serial Number: **64483C-A80-0122C**

Console: **RS232**

Kernel: **2700000**

Kernel Args: **root=/dev/ram0**

HW Addr0: **00 00 00 00 00 00**

Firmware Versior: **1.0.0.0**

Start Point: **11200000-40000000**

RAM Image: **ram**

Cache: **on**

Bootp enable? Y/N: **no**

If bootp disabled, could put other BP\_ vars here...

Autoboot after (sec): **5**

MPS Link Node MP10

LCLS MPS Link Node:  
EIOC:IN20:MP10

ADC Register contents

Xilinx Temp (deg F): **112.000**

Xilinx Temp (deg C): **44.722**

Board Temp (deg F): **91.500**

Board Temp (deg C): **33.333**

3.3 Volts: **3.298**

5 Volts: **4.980**

12 Volts: **12.450**

24 Volts: **24.411**

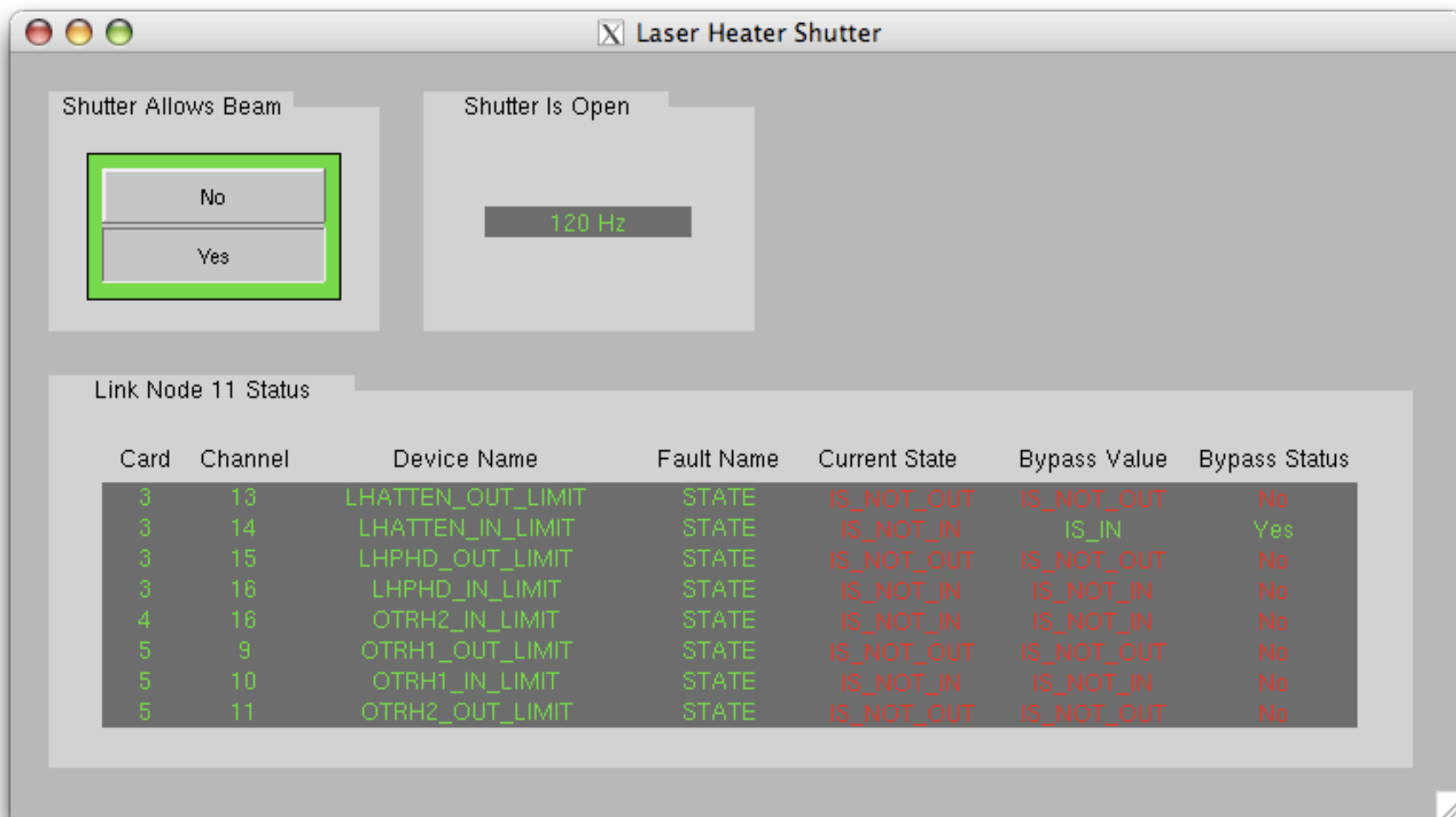
MPS Link Node MP10

LCLS MPS Link Node:  
EIOC:IN20:MP10

Debounce Register Setpoints and Readbacks

Channel	Debounce time Setpoint (us)	Debounce time Readback (us)	Channel	Debounce time Setpoint (us)	Debounce time Readback (us)	Channel	Debounce time Setpoint (us)	Debounce time Readback (us)
0	0	0	32	0	0	64	0	0
1	0	0	33	0	0	65	0	0
2	0	0	34	0	0	66	0	0
3	0	0	35	0	0	67	0	0
4	0	0	36	0	0	68	0	0
5	0	0	37	0	0	69	0	0
6	0	0	38	0	0	70	0	0
7	0	0	39	0	0	71	0	0
8	0	0	40	0	0	72	0	0
9	0	0	41	0	0	73	0	0
10	0	0	42	0	0	74	0	0
11	0	0	43	0	0	75	0	0
12	0	0	44	0	0	76	0	0
13	0	0	45	0	0	77	0	0
14	0	0	46	0	0	78	0	0
15	0	0	47	0	0	79	0	0
16	0	0	48	0	0	80	0	0
17	0	0	49	0	0	81	0	0
18	0	0	50	0	0	82	0	0
19	0	0	51	0	0	83	0	0
20	0	0	52	0	0	84	0	0
21	0	0	53	0	0	85	0	0
22	0	0	54	0	0	86	0	0
23	0	0	55	0	0	87	0	0
24	0	0	56	0	0	88	0	0
25	0	0	57	0	0	89	0	0
26	0	0	58	0	0	90	0	0
27	0	0	59	0	0	91	0	0
28	0	0	60	0	0	92	0	0
29	0	0	61	0	0	93	0	0
30	0	0	62	0	0	94	0	0
31	0	0	63	0	0	95	0	0

# MPS User Interface



The screenshot shows a window titled "Laser Heater Shutter" with three main sections:

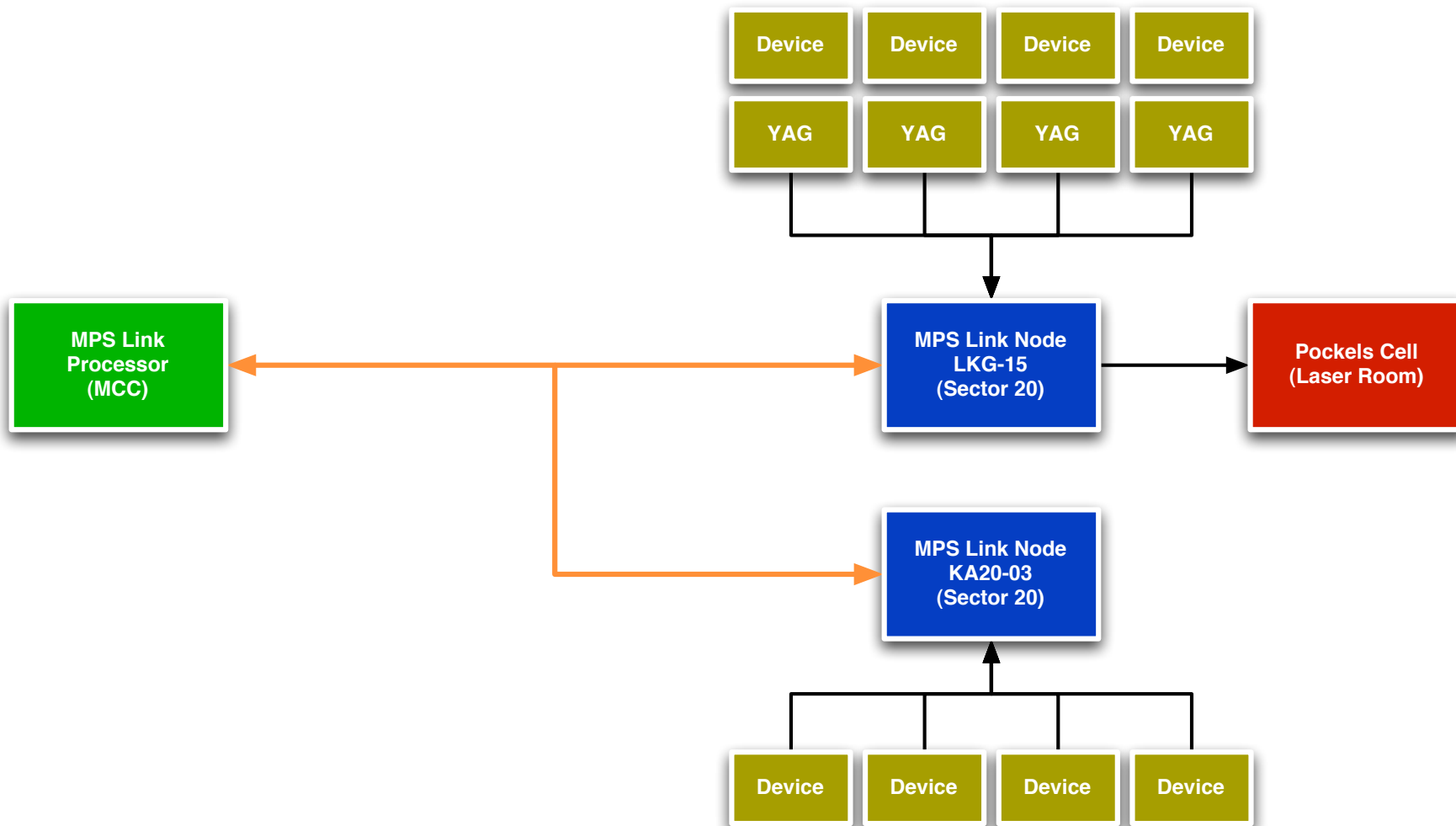
- Shutter Allows Beam:** A panel containing two buttons, "No" and "Yes". The "No" button is highlighted with a green border.
- Shutter Is Open:** A panel displaying the text "120 Hz" in green.
- Link Node 11 Status:** A table showing the status of various devices.

Card	Channel	Device Name	Fault Name	Current State	Bypass Value	Bypass Status
3	13	LHATTEN_OUT_LIMIT	STATE	IS_NOT_OUT	IS_NOT_OUT	No
3	14	LHATTEN_IN_LIMIT	STATE	IS_NOT_IN	IS_IN	Yes
3	15	LPHD_OUT_LIMIT	STATE	IS_NOT_OUT	IS_NOT_OUT	No
3	16	LPHD_IN_LIMIT	STATE	IS_NOT_IN	IS_NOT_IN	No
4	16	OTRH2_IN_LIMIT	STATE	IS_NOT_IN	IS_NOT_IN	No
5	9	OTRH1_OUT_LIMIT	STATE	IS_NOT_OUT	IS_NOT_OUT	No
5	10	OTRH1_IN_LIMIT	STATE	IS_NOT_IN	IS_NOT_IN	No
5	11	OTRH2_OUT_LIMIT	STATE	IS_NOT_OUT	IS_NOT_OUT	No

# Testing and Production

- Beam Test
- Laser Heater Shutter

# Beam Test

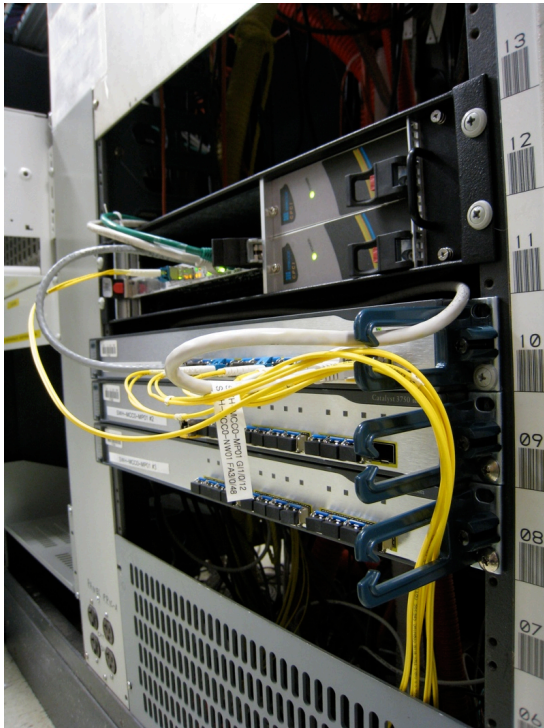


# Beam Test

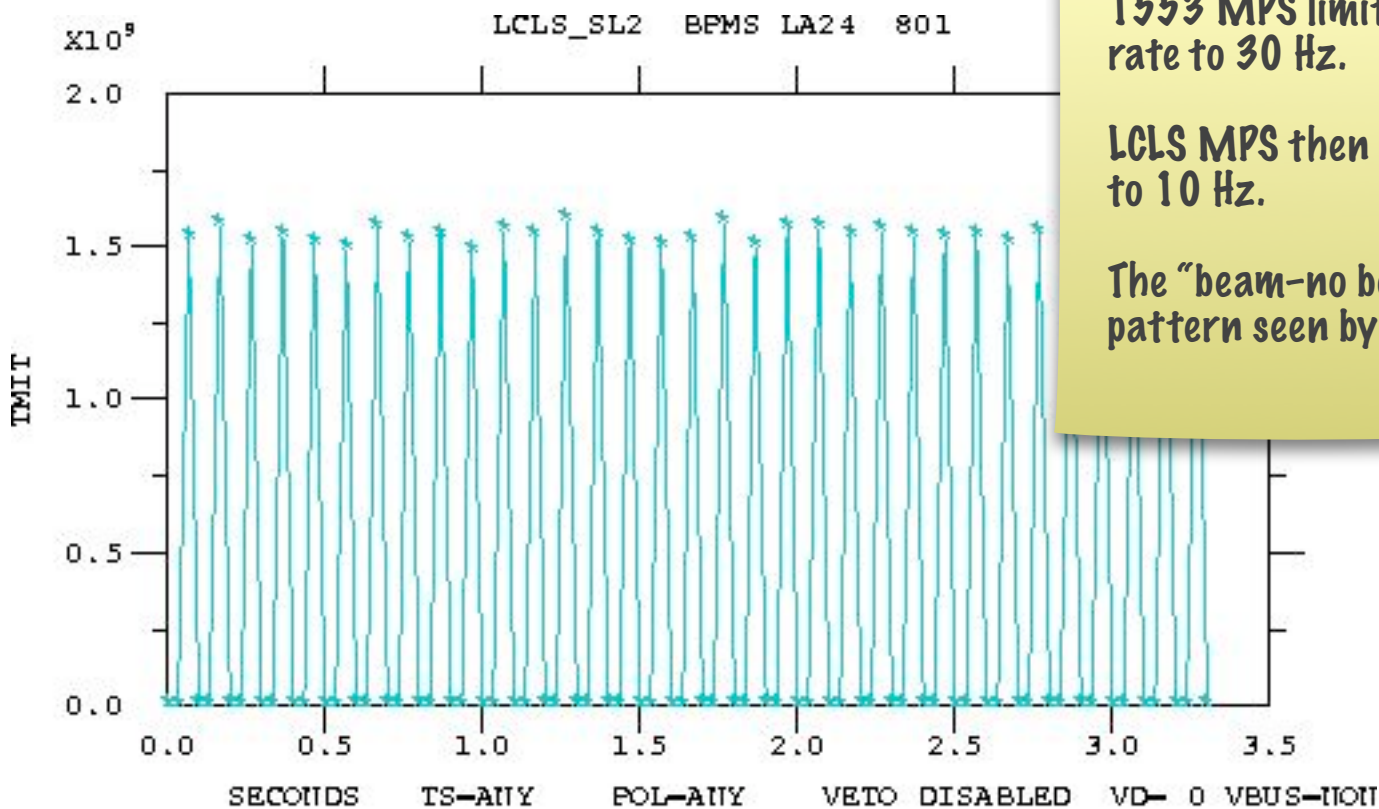




# Beam Test



# 10 Hz Beam Limit



1553 MPS limits beam rate to 30 Hz.

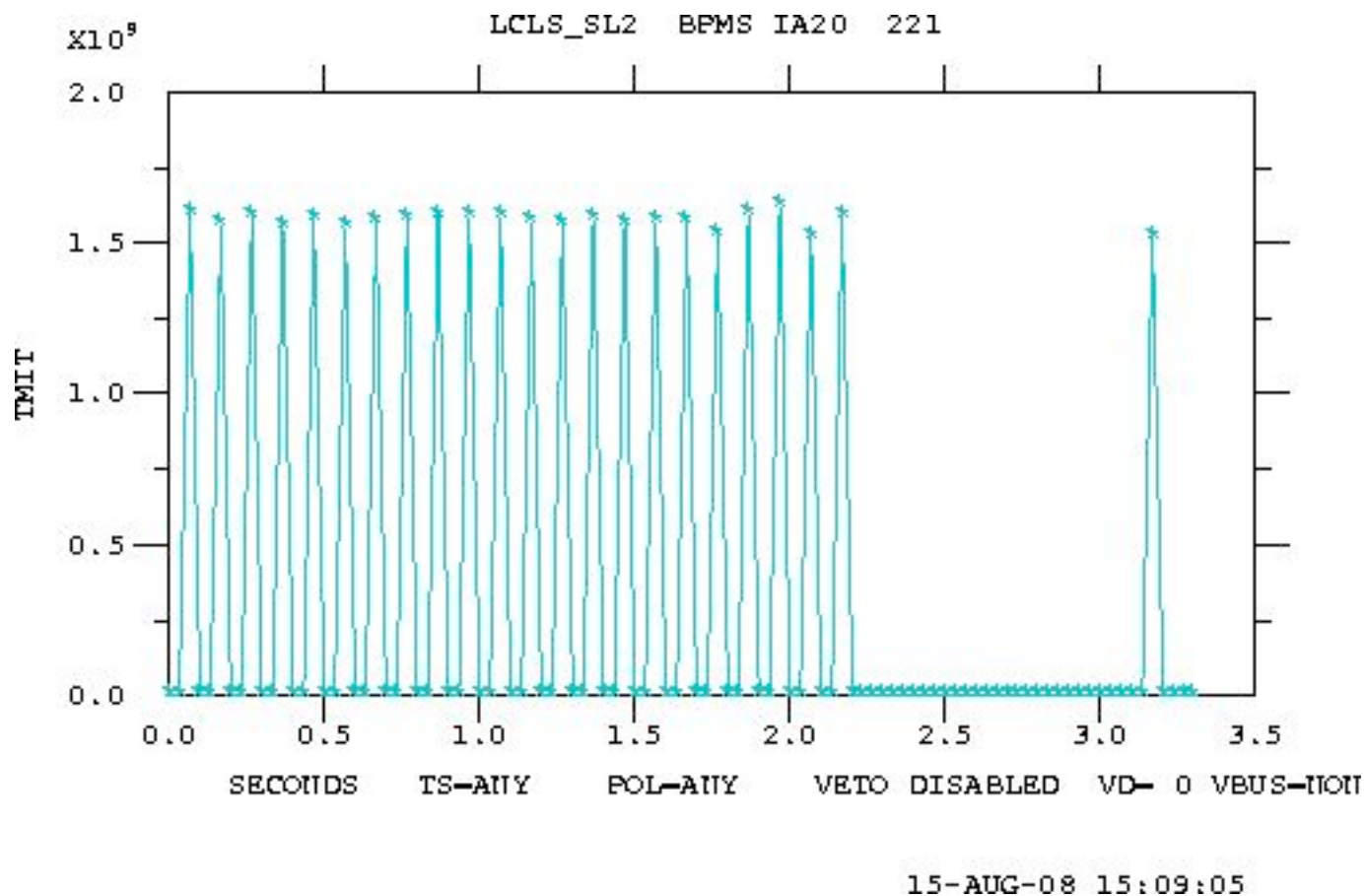
LCLS MPS then limits rate to 10 Hz.

The "beam-no beam" pattern seen by the BPMs.

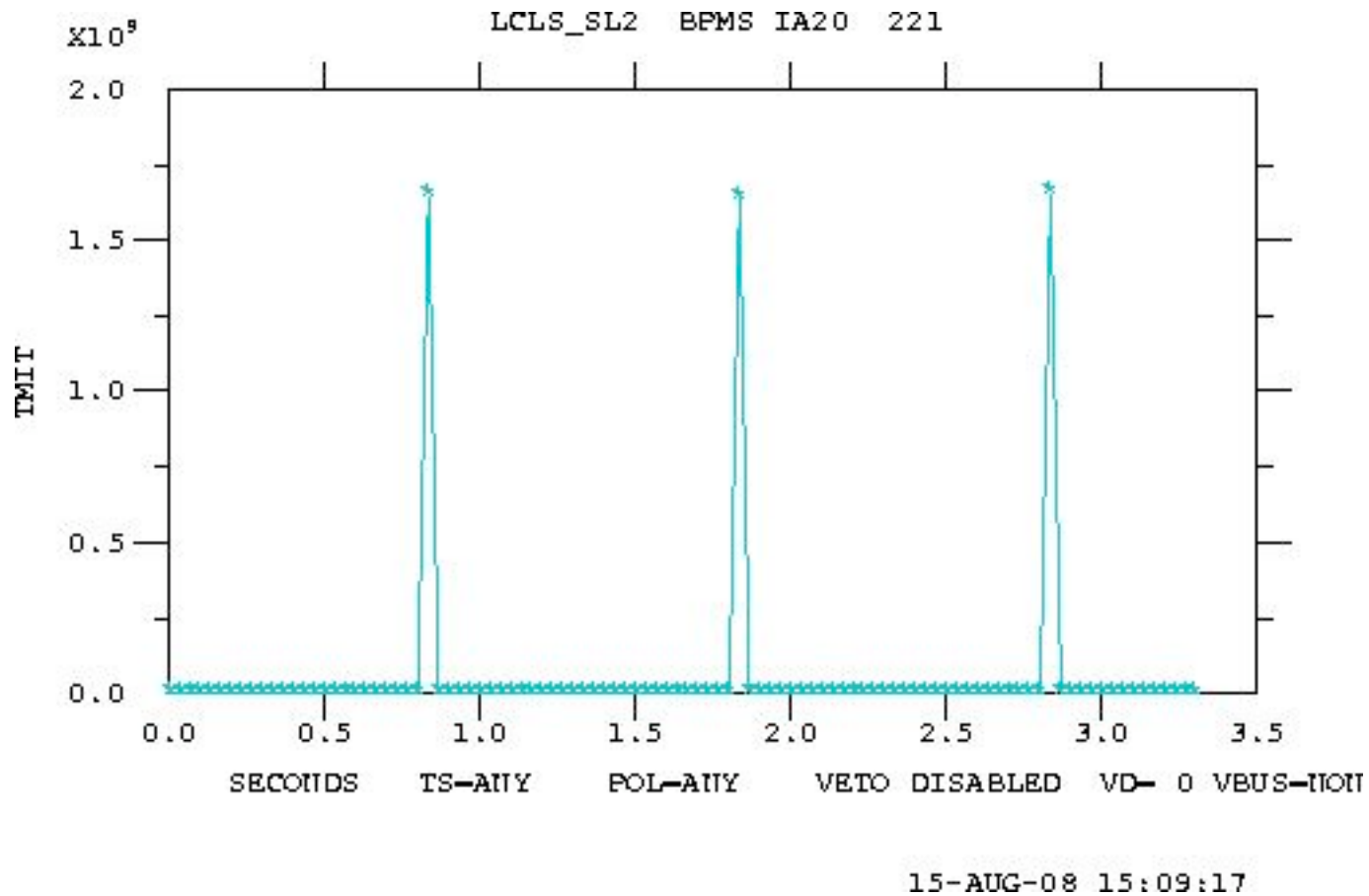
15-AUG-08 15:04:34



# Transition from 10 Hz to 1 Hz



# 1 Hz Rate Limit



# Laser Heater Shutter

**Shutter Allows Beam**

**Shutter Is Open**

120 Hz

**Link Node 11 Status**

Card	Channel	Device Name
3	13	LHATTEN_OUT_L
3	14	LHATTEN_IN_L
3	15	LPHPD_OUT_L
3	16	LPHPD_IN_L
4	16	OTRH2_IN_L
5	9	OTRH1_OUT_L
5	10	OTRH1_IN_L
5	11	OTRH2_OUT_L

**Shutter Allows Beam**

**Shutter Is Open**

0 Hz

**Link Node 11 Status**

Card	Channel	Device Name	Fault Name	Current State	Bypass Value	Bypass Status
3	13	LHATTEN_OUT_LIMIT	STATE	IS_NOT_OUT	IS_NOT_OUT	No
3	14	LHATTEN_IN_LIMIT	STATE	IS_IN	IS_NOT_IN	No
3	15	LPHPD_OUT_LIMIT	STATE	IS_NOT_OUT	IS_NOT_OUT	No
3	16	LPHPD_IN_LIMIT	STATE	IS_IN	IS_NOT_IN	No
4	16	OTRH2_IN_LIMIT	STATE	IS_NOT_IN	IS_NOT_IN	No
5	9	OTRH1_OUT_LIMIT	STATE	IS_OUT	IS_NOT_OUT	No
5	10	OTRH1_IN_LIMIT	STATE	IS_NOT_IN	IS_NOT_IN	No
5	11	OTRH2_OUT_LIMIT	STATE	IS_OUT	IS_NOT_OUT	No