



Bright Ideas in Fiberoptics

LAPPD Measurement & Test Workshop

Schedule & Sample Agenda

Incom is hosting our second LAPPD Measurement & Test Workshop which will be held as follows:

1. **Three Day Workshop** - The Workshop will take place four times per year, typically Tuesday, Wednesday and Thursday. Testing will mostly focus on evaluating the performance of recently fabricated LAPPD tiles.
2. **Workshop Schedule / Dates:**

Workshop #	Date
4	Oct 9-11, 2018
5	Feb 12-14, 2019
6	May 14-16, 2019
7	Sep 10-12, 2019
8	Feb 11-13, 2020
9	May 12-14, 2020

Workshops will begin at 8:30 AM on a Tuesday morning, through Thursday concluding about 5:30 PM, with optional dinner for those staying overnight. In view of the early start and full third day, visitors are encouraged to arrive in the Charlton area the day / evening before.

3. **Location:** Incom R&D Facility, 242 Sturbridge Road (Route 20), Charlton, MA 01507
4. **Your Hosts:** Dr. Mark Popecki, Dr. Bill Worstell, Dr. Camden Ertley and Dr. Bernhard Adams
5. **Agenda:** Detail agendas will be available prior to each Workshop, including proposed speaking engagements by Early Adopters during planned luncheon seminar.
6. **On-site Participants:**
 - Typically 3-5 visitors for a given workshop
 - Maximum of 7 visitors to facilitate hands on access to equipment and hardware
7. **Remote GoToMeeting Connection for Luncheon Seminars** – Tentative: If needed, we will set up a remote connection.

Travel Planning - To help facilitate your travel planning, refer to the following documents available on this web page.

- 1) Directions to Incom R&D
- 2) Local Accommodations – book early.
- 3) Line drawing showing relation between Incom R&D and local accommodations
- 4) List of Acceptable ITAR identification required to visit Incom

ITAR Requirements - Incom is an ITAR Controlled Facility. For that reason the following regulations must be honored by all on-site participants:

- The names of all visitors must be provided to “Incom Compliance”, well in advance of the visit, to allow names to be screened against a list of barred individuals.



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- All visitors are required to show identification upon arrival showing your status as a US Person, as defined under ITAR regulations
- Prospective visitors should review the summary document that provides guidance on appropriate documentation typically a US Passport if you are a citizen, or a Green Card, if not, but other combinations are possible.

Workshop Goals & Objectives

1. The goal of the workshop is to familiarize potential users with the LAPPD, and to give a large number of users early access. The joint activity will help in establishing standardized measurement protocols.
2. Training is a primary objective of the Workshop, to provide early adopters who will have direct responsibility for setting up and operating the detector tiles with practical experience handling and testing an Incom supplied LAPPD.
3. Incom wishes to promote use of standardized measurement techniques for initial evaluation of LAPPD. An important initial benefit of making tiles available to other laboratories is to provide an opportunity for “round robin testing” where different groups test tiles under different conditions, using “standardized” testing protocols, that facilitates easy comparison to results between different users including Incom and other early adopters. Incom recognizes that a wide variety of electronic hardware is available to power and extract signals from LAPPD, and that different researchers will choose to use different set-ups according to their specific program needs, and equipment they have available to them.
4. To promote safe and appropriate handling of the LAPPD, all early adopters that wish to eventually receive an Incom LAPPD will be expected to have their measurement & test personnel participate in an Incom Measurement & Test Workshop, as a prerequisite to receiving a detector tile.
5. Incom will present hardware and procedures currently being used to characterize LAPPD and provide guidance on safe handling of the detector. Participants will also be invited to offer comments and suggestions with the goal of achieving consensus on preferred measurement strategies.
6. The Workshops will provide a forum for evaluating any special electronics readout boards that early adopters might be planning on using in their own experiments; examples might be Psec4 Eval boards, Ultralytics PSI DRS4 LAPPD Readout Card, CAEN DRS4 Readout, other.
7. Early adopters are invited to make a short (30-45 minute) presentation of their own experimental plans, including a schedule of when they would expect to be ready to evaluate LAPPD, estimates of the number they might need, descriptions of their own experimental set-ups, and the status of their current funding.



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8. Data collected during this testing will be available to the early adopters for their own evaluation and use, which might include using the data to demonstrate the readiness of LAPPD technology for their programs.

SAMPLE AGENDA – Tuesday

8:30 to 9:00 AM - ASSEMBLE INCOM R&D FACILITY - COFFEE & PASTRY

9:00 – 10:00 AM - LAPPD OVERVIEW (Conference Room 1)

- **LAPPD Pilot Production Update & Collaboration with Early Adopters (MJ Minot)**
- **LAPPD interfaces and connections (MAP)**
 - ✓ LAPPD connection diagram and supporting hardware
 - ✓ HV supplies
 - ✓ SMA and HV edge connectors, ultem housing
 - ✓ HV current logging
 - ✓ Resistance vs. voltage for each MCP
- Dark box and supporting hardware
 - ✓ Light sources:
 - ✓ Pulsed diode 60 ps Laser and 365 nm UV LED
 - ✓ Light monitor
- LAPPD Safety & Handling
 - ✓ High Voltage Safety
 - ✓ UHV All Glass Package
 - ✓ Connecting to the silver strips
 - ✓ Residual Effects of Exposure to light
- DRS4 Evaluation Board Use
- Packaging & Shipping

10:00– 11:00 PM FACILITY TOUR & OPERATIONAL OVERVIEW

- Tour of Rt 20 cleanroom, production and LAPPD testing facilities

11:00– 12:00 PM HANDS ON TESTING OF LAPPD IN DARK BOX ROOM

- Pulse height distributions for single photoelectrons
 - Waveform examination for features such as multiple pulse groups
 - Verification of single photoelectron operation



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12:00 – 1:00 PM LUNCH and SEMINAR(s)

TBD

1:00– 5:30 PM HANDS ON TESTING OF LAPPD IN DARK BOX ROOM

- Gain vs. MCP voltage and photocathode voltage, with pulse height distributions from:
 - DRS4 waveform samplers
 - Charge amplifier/ADC
 - Two or more locations on the LAPPD
 - Dark pulse PHDs
- Pulse height vs. laser repetition rate
- QE measurement overnight
 - Set-up Auto Scan for Photocathode QE (discussion, then run at the end of the day)

6:00 PM – Dinner - TBD

SAMPLE AGENDA – Wednesday

8:30 to 9:00 AM - ASSEMBLE INCOM R&D FACILITY - COFFEE & PASTRY

9:00 – 10:00 AM – REVIEW OF RESULTS OF QE SCAN (Conference Room 1)

10:00 – 12:00 PM – RESUMPTION OF LAPPD MEASUREMENTS:

- Complete pulse height distribution measurements
- Begin Position measurements by scanning along strips, and across strips – single photoelectron
- Scan along a strip while measuring both ends

12:00 – 1:00 PM LUNCH and SEMINAR(s)

TBD

1:00 – 5:45 PM HANDS ON TESTING OF LAPPD IN DARK BOX ROOM

- Continue position scans along a strip – single photoelectron
 - Observe adjacent strip behavior – crosstalk or reflections
 - Measure variance in timing and therefore position uncertainty



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- Gain at several points along a strip
- Perform scan across strips, with centroiding to obtain position
- Repeat QE measurement overnight if needed
- **6:00 PM – Dinner (TBD)**

SAMPLE AGENDA – Thursday

8:30 to 9:00 AM - ASSEMBLE INCOM R&D FACILITY - COFFEE & PASTRY

9:00 – 12:00 HANDS ON TESTING OF LAPPD IN DARK BOX ROOM

- Continue scanning across strips, measuring position resolution, multiple photoelectrons
- Cross-strip position resolution vs. voltage between MCP and anode
- Transit Time Variation measurement

12:00 - 1:00 PM – LUNCH and SEMINAR

TBD

1:00 – 5:30 PM HANDS ON TESTING OF LAPPD & REVIEW OF RESULTS

- Serendipitous measurements as needed to address earlier observations, including:
- Review of Workshop data
- Discussion of Open Issues Identified
- Results & Conclusions
- Recommendations

6:00 PM – Dinner (TBD)