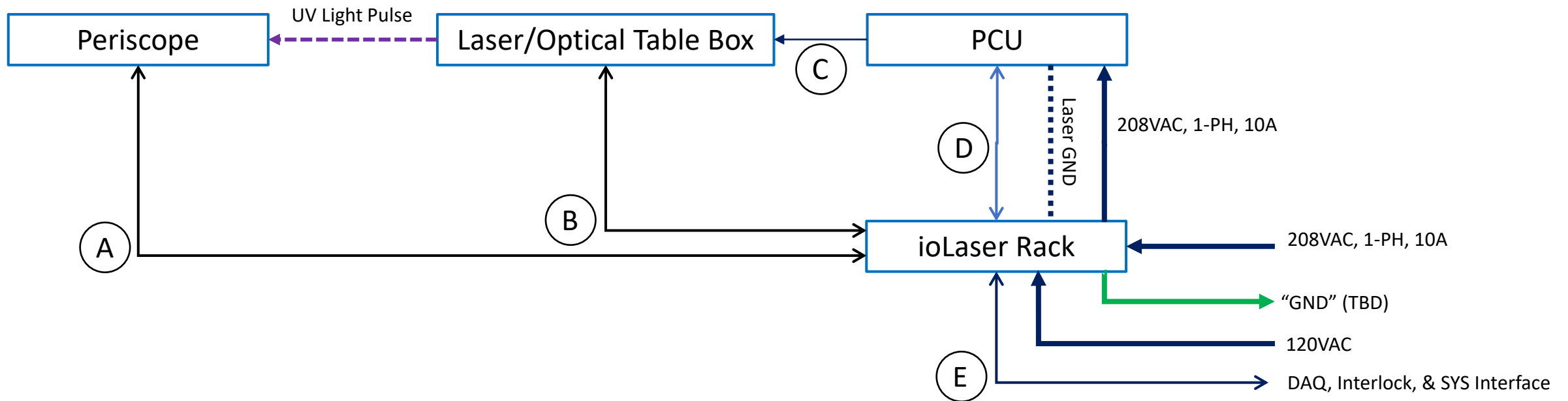


# Electrical Interconnection Summary for Ionization Laser system (top-of-the-TPC)



## Abbreviations used

- PCU = Power/Cooling Unit
- MDB = Motor Drive Box
- EIB = Encoder Interface Box
- LIC = Laser Instrumentation Control box
- LILV = Laser Instrumentation Low Voltage chassis

## Cable Group A

### Periscope – ioLaser Rack

#### Motion Control:

Motor 1 power/control cable  
Motor 2 power/control cable  
Motor 3 power/control cable

#### Destination: ioLaser Rack

Motor driver box (MDB) in laser rack  
Motor driver box (MDB) in laser rack  
Motor driver box (MDB) in laser rack

#### On Periscope

Motor 1 in periscope rotary stage  
Motor 2 in periscope linear actuator  
Motor 3 in periscope bellows retraction system

Encoder 1 supply/readout cable  
Encoder 2 supply/readout cable  
Encoder 3 supply/readout cable

Encoder interface box (EIB) in laser rack  
Encoder interface box (EIB) in laser rack  
Encoder interface box (EIB) in laser rack

Encoder 1 in periscope rotary stage  
Encoder 2 in periscope linear actuator  
Encoder 3 in periscope bellows retraction system

#### Camera:

Illuminator – LVDC voltage controller  
USB 3.0 active extension cable  
Power cable for camera, 2 conductor

LVDC supply in laser rack  
server in laser rack  
12V 3A power supply in laser rack

camera  
periscope camera  
periscope camera

#### Photodiode/photomultiplier:

DC high voltage  
Anode pulse

HVDC supply in laser rack  
pulse processing module in laser rack

coaxial cable from PMT anode

Inclinometer RS-485 readout cable (assuming 1 readout interface per 4 periscopes)    USB-to-RS485 interface in laser rack    inclinometer on periscope nearest laser rack

## Cable Group B

### Laser Optical Table Box

- Altechna Attenuator Watt-Pilot
  - 12VDC Pwr Supply (needs 120VAC or a 12VDC line)
  - Watt-Pilot Controller (USB or RS-232)
- LV PWR Alignment Laser
- ThorLabs Monitor photodiode
  - signal fast analog pulse (coaxial cable)
  - DC bias supply (12VDC line)
- Motorized iris
  - Stepper motor driver
  - Encoder

Attenuator power cable      laser instrumentation LV chassis in laser rack      Attenuator in Laser Box (sitting on a table on top of the cryostat)

Attenuator control/readout cable      laser instrumentation control (LIC) box in laser rack      Attenuator in Laser Box (sitting on a table on top of the cryostat)

Automatic Iris power cable      laser instrumentation LV chassis in laser rack      iris in Laser Box (sitting on a table on top of the cryostat)

Automatic Iris control/readout cable      laser instrumentation control (LIC) box in laser rack      iris in Laser Box (sitting on a table on top of the cryostat)

Photodiode power cable      laser instrumentation LV chassis in laser rack      Photodiode in Laser Box (sitting on a table on top of the cryostat)

Photodiode control/readout cable      laser instrumentation control (LIC) box in laser rack      Photodiode in Laser Box (sitting on a table on top of the cryostat)

Alignment green laser power cable      laser instrumentation LV chassis in laser rack      Alignment laser in Laser Box (sitting on a table on top of the cryostat)

Alignment green laser control/readout cable      laser instrumentation control (LIC) box in laser rack      Alignment laser in Laser Box (sitting on a table on top of the cryostat)

Motorized mounts power cable      laser instrumentation LV chassis in laser rack      Motorized mounts in Laser Box (sitting on a table on top of the cryostat)

**Cable Group C**

**Laser Optical Table Box**

**Laser Head:**

- Flash lamp cable – HV Plug Connector, supplied by vendor
- Control signals & LVDC Pwr – vendor supplied cable, hard wired into Laser Head

HV head plug cable

Power/Cooling Unit (PCU) in laser rack

Laser head inside box sitting on an optical table on top of the cryostat

Cooling/control umbilical

Power/Cooling Unit (PCU) in laser rack

Laser head inside box sitting on an optical table on top of the cryostat

**Cable Group D**

**Laser Power Supply and Control Box (PCU) To ioLaser Electronics Rack**

AC Pwr 208VAC 1-Phase, 10A

Ground connection

Interface control signals – to be filled out

## Cable Group E

### DAQ & System:

#### From ioLaser Electronics Rack to World

AC Pwr 208VAC 1-Phase, 10A

AC Pwr 120VAC

Ground connection

CIB timing cable (optical)

CIB in laser rack DAQ timing system switch

CIB data cable (optical)

CIB in laser rack DAQ data switch

LIC to CIB cables (column 2 (see Schematics))

CIB in LRTFC2

LIC box in LRTFC1, LRTFC2, LRTFC3

PCU to CIB cables (column 2 (see Schematics))

CIB in LRTFC2

PCU in LRTFC1, LRTFC2, LRTFC3

EIB to CIB cables (column 2 (see Schematics))

CIB in LRTFC2

EIB in LRTFC1, LRTFC2, LRTFC3

MDB to CIB cables (column 2 (see Schematics))

CIB in LRTFC2

MDB in LRTFC1, LRTFC2, LRTFC3

PCU to CIB cables (column 3)

CIB in LRTFC5

PCU in LRTFC4, LRTFC5, LRTFC6

LIC to CIB cables (column 3)

CIB in LRTFC5

LIC box in LRTFC4, LRTFC5, LRTFC6

EIB to CIB cables (column 3)

CIB in LRTFC5

EIB in LRTFC4, LRTFC5, LRTFC6

MDB to CIB cables (column 3)

CIB in LRTFC5

MDB in LRTFC4, LRTFC5, LRTFC6

LIC to CIB cables (columns 4)

CIB in LRTFC8

LIC box in LRTFC7, LRTFC8, LRTFC9

PCU to CIB cables (columns 4)

CIB in LRTFC8

PCU in LRTFC7, LRTFC8, LRTFC9

EIB to CIB cables (columns 4)

CIB in LRTFC8

EIB in LRTFC7, LRTFC8, LRTFC9

MDB to CIB cables (columns 4)

CIB in LRTFC8

MDB in LRTFC7, LRTFC8, LRTFC9

## Electrical Interconnection Summary for Ionization Laser system (top-of-the-TPC)

HV head plug cable	Power/Cooling Unit (PCU) in laser rack	Laser head inside box sitting on an optical table on top of the cryostat
Cooling/control umbilical	Power/Cooling Unit (PCU) in laser rack	Laser head inside box sitting on an optical table on top of the cryostat
Motor 1 power/control cable	Motor driver box (MDB) in laser rack	Motor 1 in periscope rotary stage
Motor 2 power/control cable	Motor driver box (MDB) in laser rack	Motor 2 in periscope linear actuator
Motor 3 power/control cable	Motor driver box (MDB) in laser rack	Motor 3 in periscope bellows retraction system
Encoder 1 supply/readout cable	Encoder interface box (EIB) in laser rack	Encoder 1 in periscope rotary stage
Encoder 2 supply/readout cable	Encoder interface box (EIB) in laser rack	Encoder 2 in periscope linear actuator
Encoder 3 supply/readout cable	Encoder interface box (EIB) in laser rack	Encoder 3 in periscope bellows retraction system
Attenuator power cable	laser instrumentation LV chassis in laser rack	Attenuator in Laser Box (sitting on a table on top of the cryostat)
Attenuator control/readout cable	laser instrumentation control (LIC) box in laser rack	Attenuator in Laser Box (sitting on a table on top of the cryostat)
Automatic Iris power cable	laser instrumentation LV chassis in laser rack	iris in Laser Box (sitting on a table on top of the cryostat)
Automatic Iris control/readout cable	laser instrumentation control (LIC) box in laser rack	iris in Laser Box (sitting on a table on top of the cryostat)
Photodiode power cable	laser instrumentation LV chassis in laser rack	Photodiode in Laser Box (sitting on a table on top of the cryostat)
Photodiode control/readout cable	laser instrumentation control (LIC) box in laser rack	Photodiode in Laser Box (sitting on a table on top of the cryostat)
Alignment green laser power cable	laser instrumentation LV chassis in laser rack	Alignment laser in Laser Box (sitting on a table on top of the cryostat)
Alignment green laser control/readout cable	laser instrumentation control (LIC) box in laser rack	Alignment laser in Laser Box (sitting on a table on top of the cryostat)
Motorized mounts power cable	laser instrumentation LV chassis in laser rack	Motorized mounts in Laser Box (sitting on a table on top of the cryostat)
Motorized mounts control/readout cable	laser instrumentation control (LIC) box in laser rack	Motorized mounts in Laser Box (sitting on a table on top of the cryostat)
Network switch cable	Network switch in laser rack	Central network distribution racks in the CUC room?
Rack power/ground cable	Laser rack main power plug	Central power/ground (building)
Laser interlock cable	Power/Cooling Unit (PCU) in laser rack	Central interlock distribution
Inclinometer RS-485 readout cable (assuming 1 readout interface per 4 periscopes)		USB-to-RS485 interface in laser rack
Inclinometer RS-485 readout cable inclinometer	Next	
USB 3.0 active extension cable for camera readout	periscope camera	server in laser rack
Power cable for camera, 2 conductor	periscope camera	12V 3A power supply in laser rack
CIB timing cable (optical)	CIB in laser rack	DAQ timing system switch
CIB data cable (optical)	CIB in laser rack	DAQ data switch

LIC to CIB cables (column 2 (see Schematics))	CIB in LRTFC2	LIC box in LRTFC1, LRTFC2, LRTFC3
PCU to CIB cables (column 2 (see Schematics))	CIB in LRTFC2	PCU in LRTFC1, LRTFC2, LRTFC3
EIB to CIB cables (column 2 (see Schematics))	CIB in LRTFC2	EIB in LRTFC1, LRTFC2, LRTFC3
MDB to CIB cables (column 2 (see Schematics))	CIB in LRTFC2	MDB in LRTFC1, LRTFC2, LRTFC3

PCU to CIB cables (column 3)	CIB in LRTFC5	PCU in LRTFC4, LRTFC5, LRTFC6
LIC to CIB cables (column 3)	CIB in LRTFC5	LIC box in LRTFC4, LRTFC5, LRTFC6
EIB to CIB cables (column 3)	CIB in LRTFC5	EIB in LRTFC4, LRTFC5, LRTFC6
MDB to CIB cables (column 3)	CIB in LRTFC5	MDB in LRTFC4, LRTFC5, LRTFC6

LIC to CIB cables (columns 4)	CIB in LRTFC8	LIC box in LRTFC7, LRTFC8, LRTFC9
PCU to CIB cables (columns 4)	CIB in LRTFC8	PCU in LRTFC7, LRTFC8, LRTFC9
EIB to CIB cables (columns 4)	CIB in LRTFC8	EIB in LRTFC7, LRTFC8, LRTFC9
MDB to CIB cables (columns 4)	CIB in LRTFC8	MDB in LRTFC7, LRTFC8, LRTFC9

### Abbreviations

**PCU** = Power/Cooling Unit

**MDB** = Motor Drive Box

**EIB** = Encoder Interface Box

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**LILV** = Laser Instrumentation Low Voltage chassis