

Long-term qualification test of SoF laser diodes at Fermilab

Test plan:

- diodes at fixed current
- pulsed operation (rate and signal amplitude TBD), same for all diodes, one channel used for monitoring (scope or ADC)
- measure only DC optical power, look for instabilities or failures

- 8 temperature sensors, both in LAr and attached to the laser diodes (with cryogenic epoxy)

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Three options for a cryostat vessel, depending on our requirements:

Stella



- No overpressure
- Fill from portable cylinders using temperature probes
- LAr purity not known
- Boil-off gas vented outside
- Simple styrofoam lid

Bo



- Possible to have overpressure
- Fill from portable cylinders or tap into PAB supply line
- LAr purity not known
- Boil-off gas vented outside
- Need to fabricate top flange

Blanche



- Must have overpressure for standard operation with condenser
- LAr is clean and purity measured
- This vessel is in high demand, e.g. SBND HV feedthrough and purity monitor tests.
- Completion of several detector R&D projects depends on its availability

Hydrostatic pressure in all cases will not exceed 100 mbarg (~60cm of LAr)

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	A	B	C	D	E	F	G	H	I
1	part ID	description	supplier	link	price	quantity	extended price	notes	
2	Optical fibers	62.5um fibers in black jacket, FC termination	MHGoPower	http://www.mhgopower.com/		60	?	48 planned, include 12 spares (or	
3	Optical feedthrough	Potted optical FT for 48 ch.	RHseals	https://www.rhseals.com/	6000	1	6000	old quote from last year, \$5,000 v	
4	Cryostat flange	Large top flange for the Bo cryostat	Kurt Lesker	https://www.lesker.com/index.cf	3000	1	3000	exact price not known, need to pro	
5	Optical power meter	24-channel optical power meter, OPM-150	Santec, USA	https://inst.santec.com/products	13900	2	27800		
6	Temperature monitor	Lakeshore 218, 8-channels	Lakeshore Cryotronics	https://shop.lakeshore.com/defa	2295	1	2295		
7	Temperature probes	Pt-100 RTDs	DigiKey	https://www.digikey.com/en/products/detai		25	28.28	eight probes needed, with spares	
8	Connector for T-monitor	DB-25 connector with screw terminals	Newark	https://www.newark.com/l-com/c	29.43	2	58.86		
9									
10	Laser diodes	Defocused 2.5mm laser diodes, 130 pcs	Lasermate	https://lasermate.com/	121.74	130	15826.2		
11	Warm PCBs	design and fabrication	FNAL			4	?		
12	Cold PCBs	design and fabrication	FNAL			12	?		
13									
14	LAr	Liquid argon (if filling from portable cylinders)	180L/350PSI cylinder	FNAL gas supply	200	50	10000	assuming replacing once a week v	
15									
16									
17							TOTAL	65008.34	

Optical power meter: Santec OPM-150



Temperature monitor: Lakeshore 218



- 24 channels
- open-bore input, fits FC or other connectors
- touch-display for quick visual failure notice
- some software is available from manufacturer

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Decisions we need to make:

1. Is overpressure important for this test, or only hydrostatic of <1m depth LAr is enough (<100 mbarg)?
2. Do we care about argon purity?