Jefferson Lab Target Status & Update

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Outline

1. Five-to-One Laser Combiner

2. New Equipment Ordered

5 – 1 Combiner

What are the issues?

- Do we see power loss as a result of the 5–1 combiner?
- Do we see power loss as a result of combining fibers?
- Will we melt our existing optics?

5 – 1 Combiner

Do we see power loss as a result of the 5–1 combiner? No.

Transmission of Various Fibers			
Fiber	Power Out (W)		
ref	2.59	4.48	8.41
1	2.60	4.65	8.44
2	2.64	4.60	8.47
3	2.56	4.50	8.80
4	2.55	4.38	8.75
5	2.57	4.55	8.79

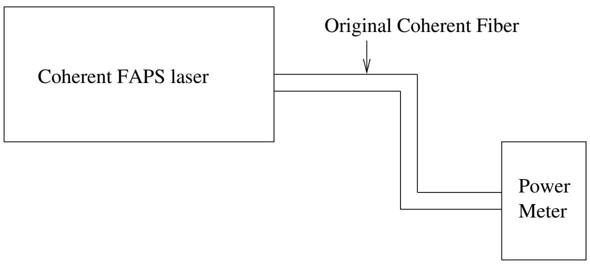
These are results for varius trials, and the last two columns are a different 5–1 combiner than the first column

5 – 1 Combiner

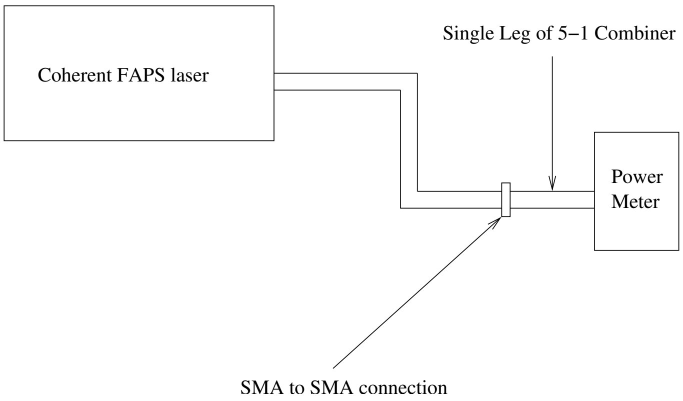
Do we see power loss as a result of combining fibers? Yes.

We typically see $< 10\%$ loss in variations of this setup

Baseline Measurement



Test Measurement



5 – 1 Combiner
Test Results

Fiber	Power	% Loss
Ref.	2.64 W	n/a
# 1	2.25 W	14.8 %
# 2	1.93 W	26.9 %
# 4	2.18 W	17.4 %
# 5	2.21 W	16.3 %
Average	2.14 W	18.4 %

What can be causing these huge losses?

5 – 1 Combiner

Exploration of the Problem

- Received 5 SMA adaptors from Coherent, and saw an immediate improvement:
  - Coherent fiber to Coherent fiber loss ≈ 1.9%
  - Coherent fiber to C-Tech 5-1 fiber loss ≈ 7.2%

- Coherent claims to have better tolerances so we measured:

	Coherent	C-Tech
Adaptor Length	0.774"	0.7722"
Adaptor I.D.	0.123"	0.1235"
other end I.D.	0.1225"	0.1235"

$5 - 1$ Combiner

Exploration of the Problem

Tried to compare C-Tech fiber to fiber connections using a C-Tech connector and a Coherent connector.

We used the 75m fiber we had already ordered from C-Tech. There was a loss of $\approx 10\%$ along the length of the 75m fiber.

Fiber	Coherent	C-Tech
# 1	6.8 %	8.7 %
# 2	7.3 %	11.1 %
# 3	19.3 %	18.5 %
# 4	11.1 %	10.9 %
# 5	7.2 %	10.7 %
Average (excluding # 3)	8.1 %	10.3 %

5 – 1 Combiner
Current Situation

- We have sent fibers and connectors to C-Tech for their evaluation.

- Probably okay with 10% loss along 75m fiber

- Fear that the loss is a combination of small corrections as the specs are close enough that nothing jumps out.

New Stuff

Most of these items are spares. The new heaters will allow us to raise test hybrid cells (of the old geometry). The new optics are for the 5–1 beam, which will be > 100 W.

Here is what we have spent so far, we'd still like to get another SRS amplifier, but those are quite expensive ($ 7,950.00 from SRS):

Item	Amount
HP 3324A Fcn Gen	$ 2,599.00
Various Optics	$ 724.00
4x 1500W heaters	$ 498.20
RF amplifier	$ 7,975.00
Frequency Counter	$ 4,950.00
Total	**$ 16,746.20**