

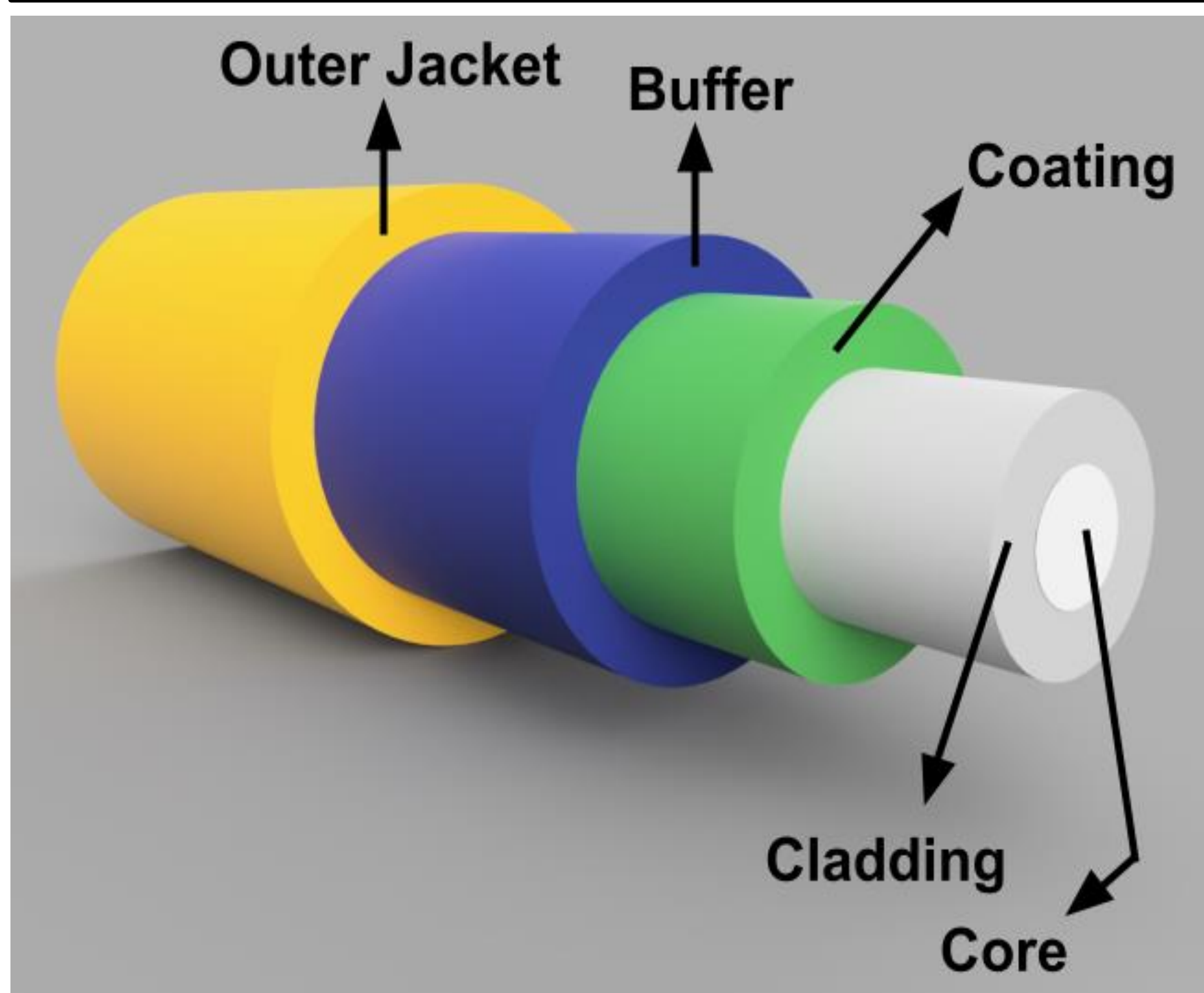
# Creating Systems for Fiber Optic Cable Testing, Repair, and Coupling

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## Introduction

Fiber optic cables are used very frequently around LCLS in order to transmit light and data. They consist of a glass core which the light moves through using total internal reflection.

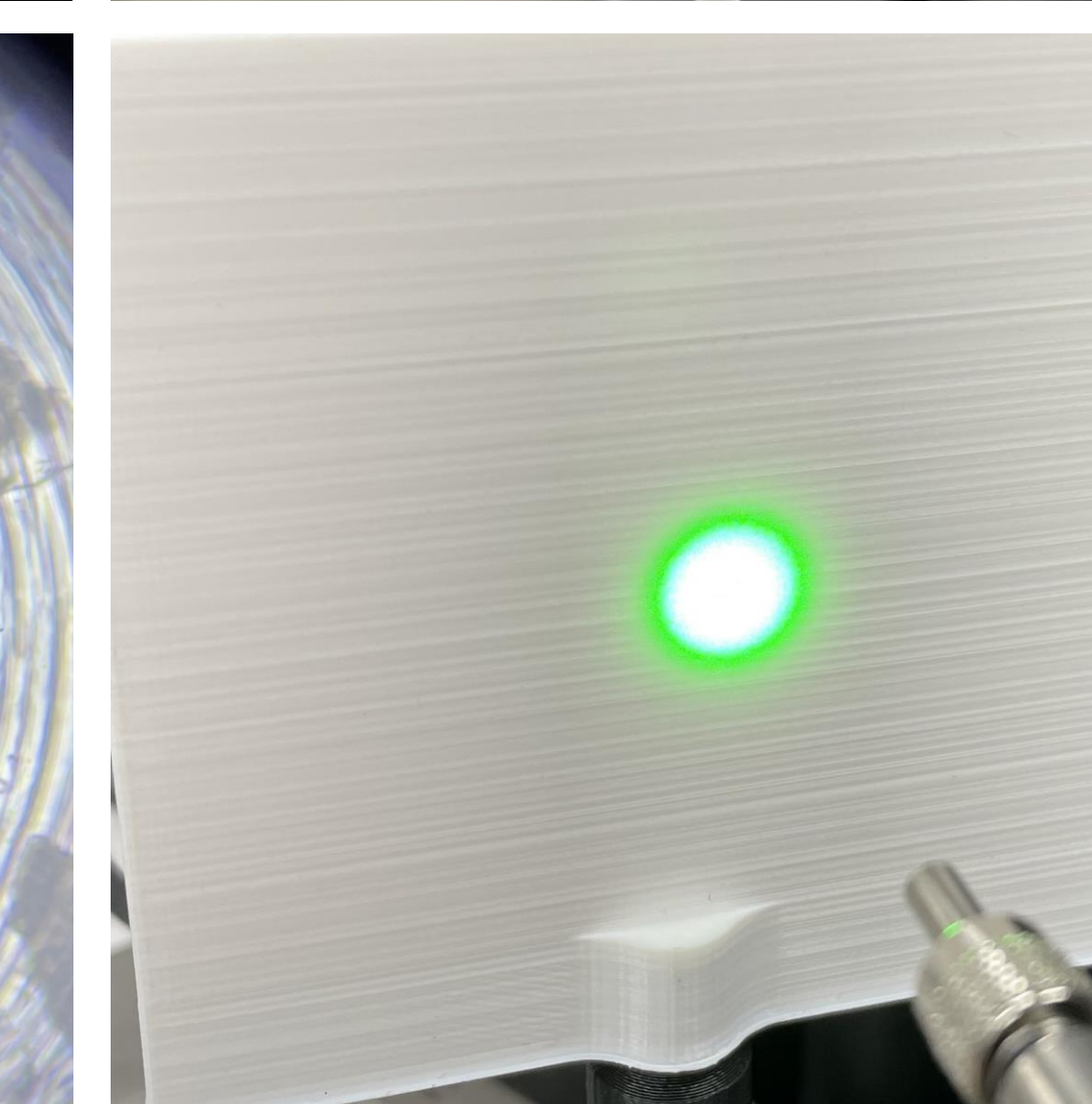
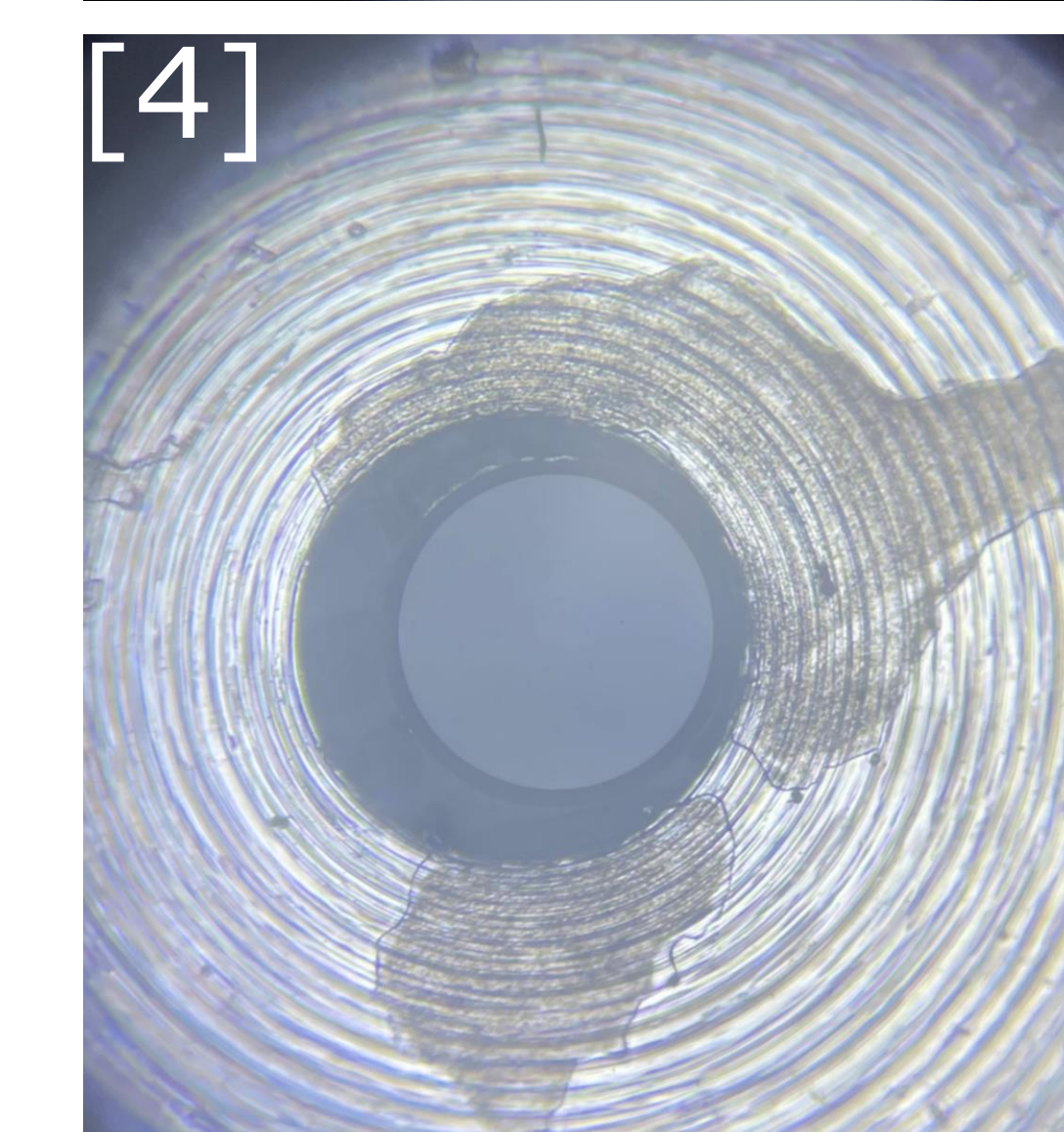
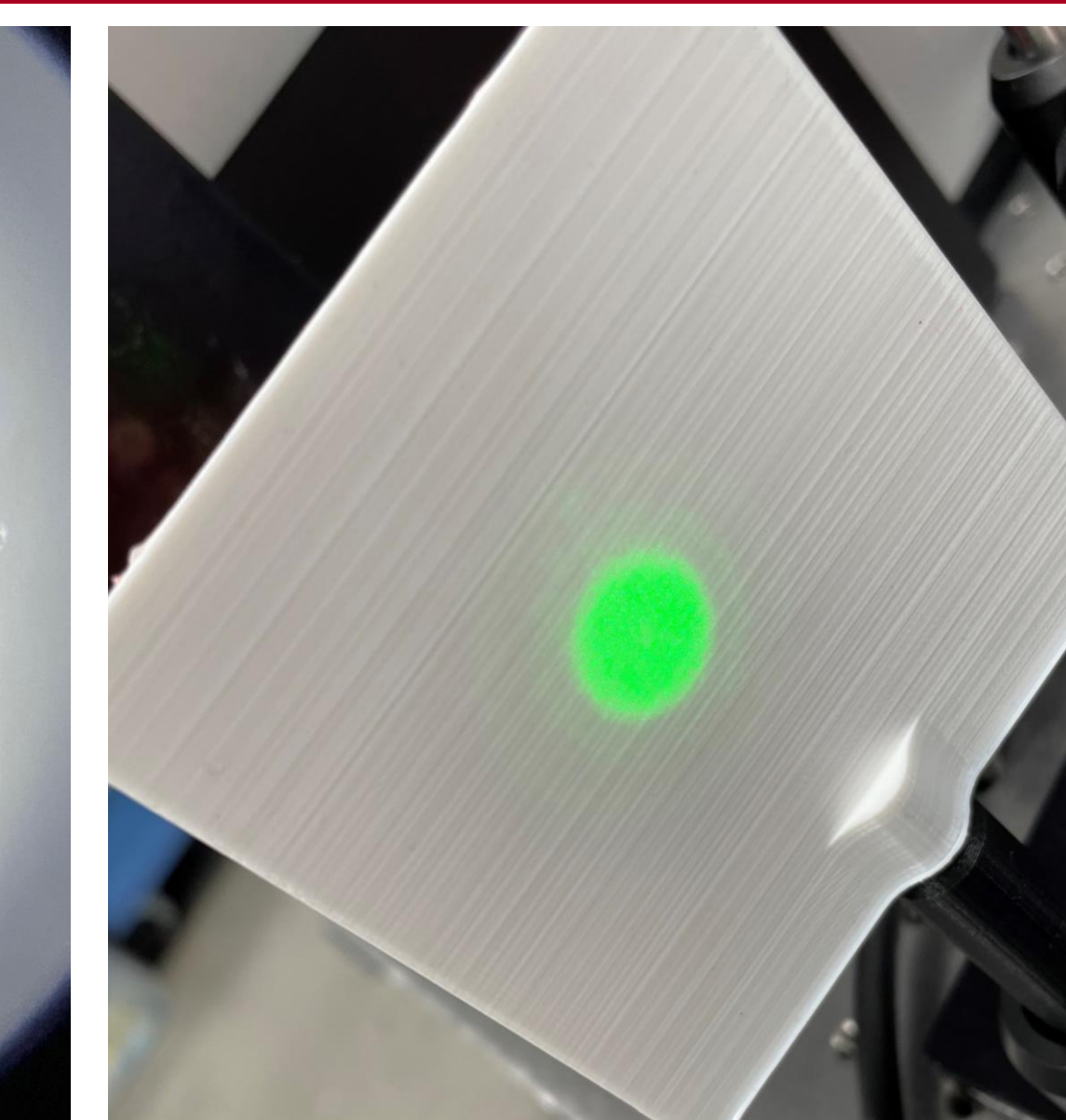
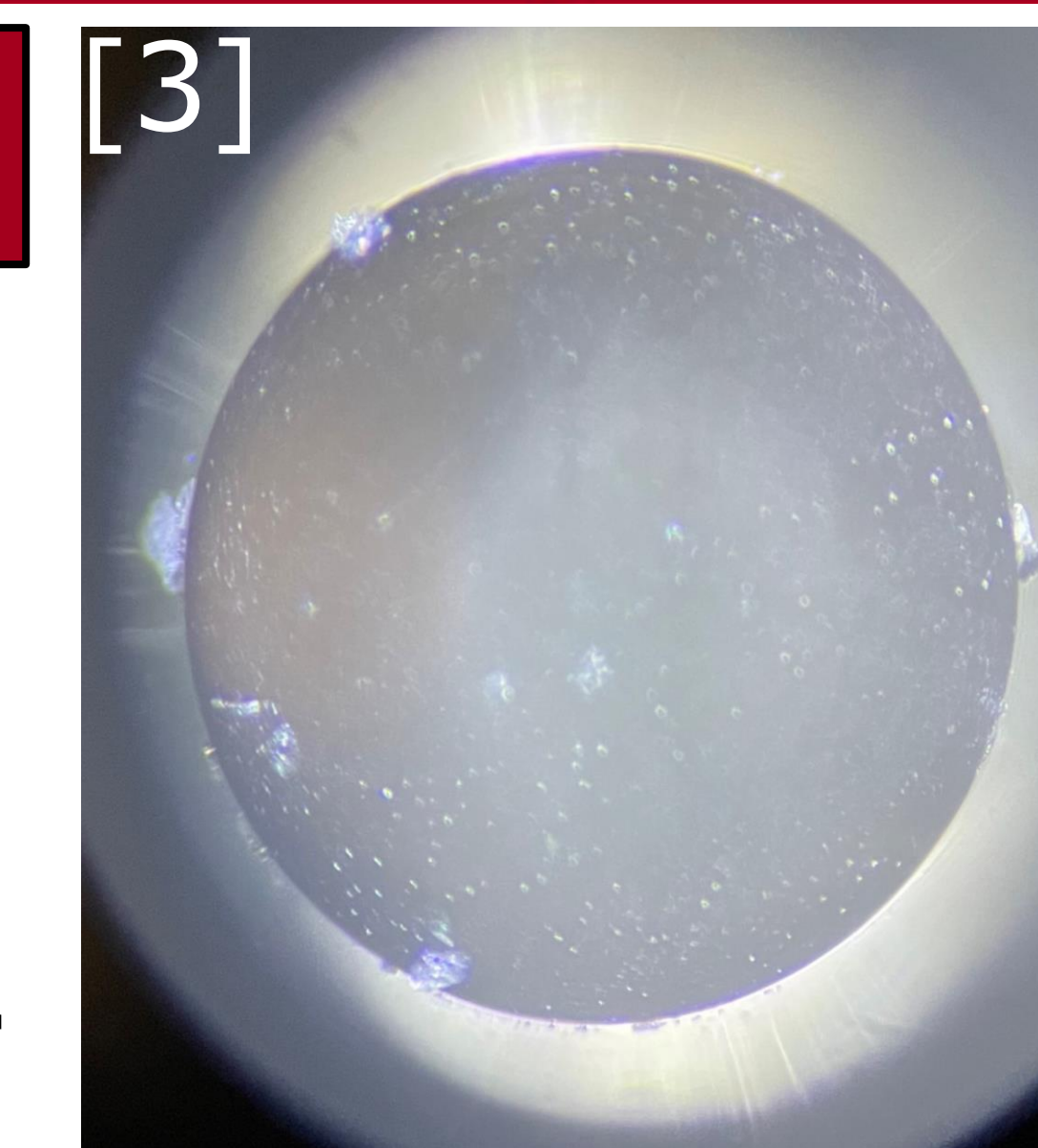
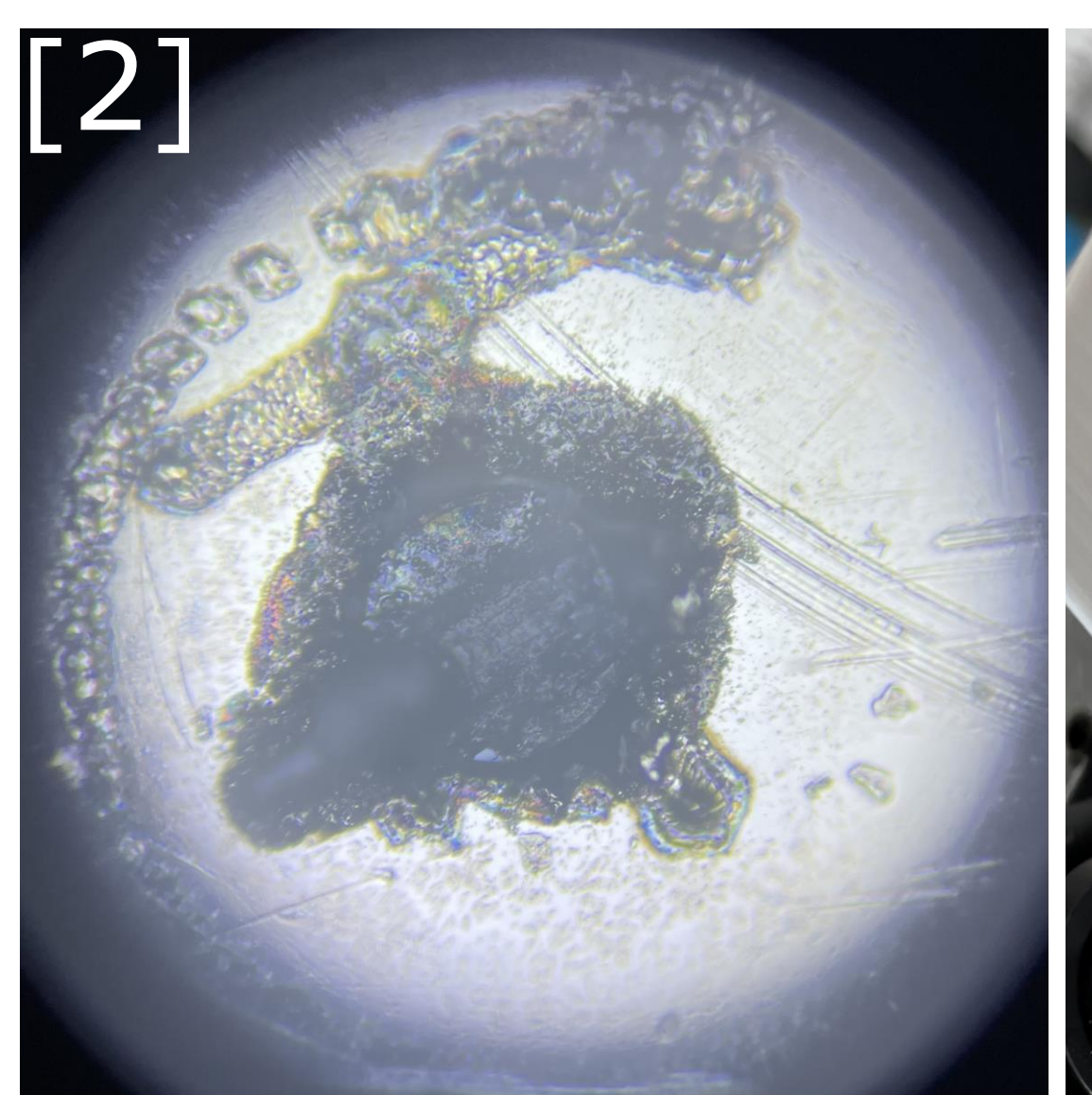
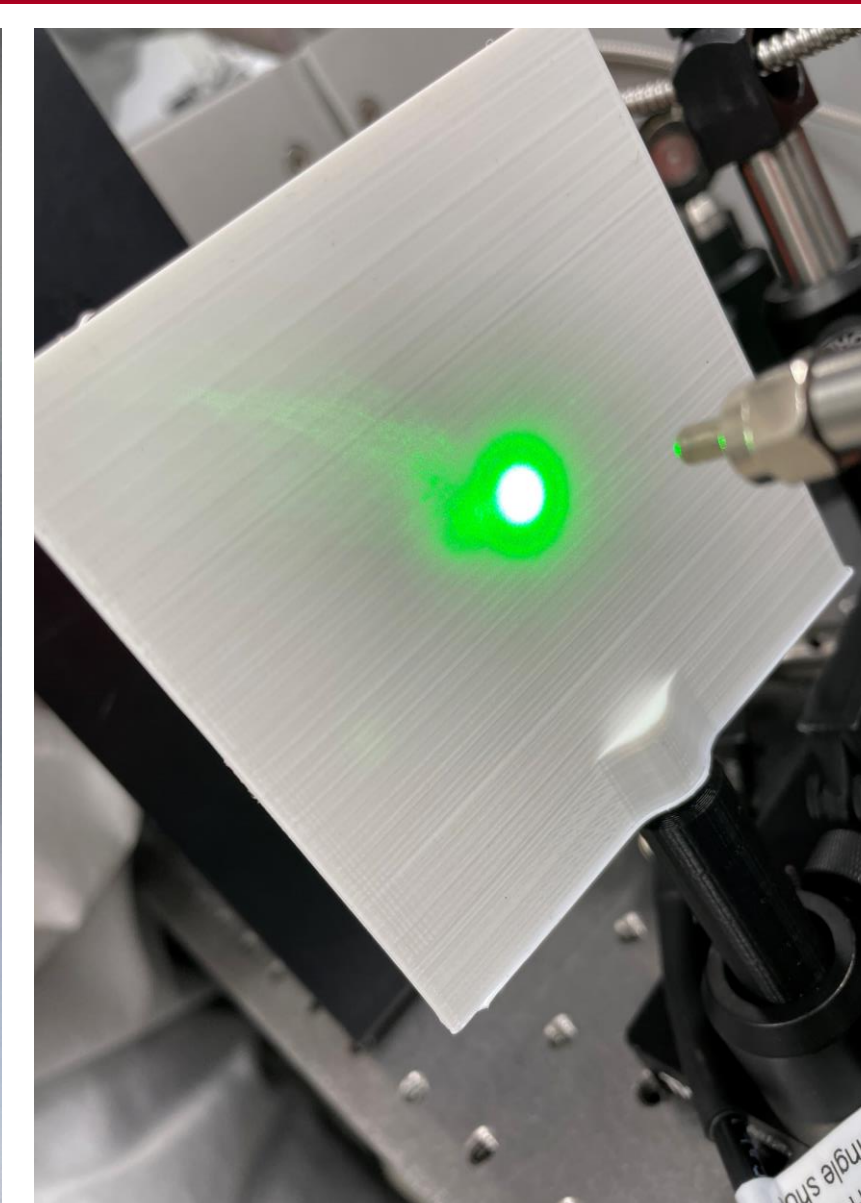
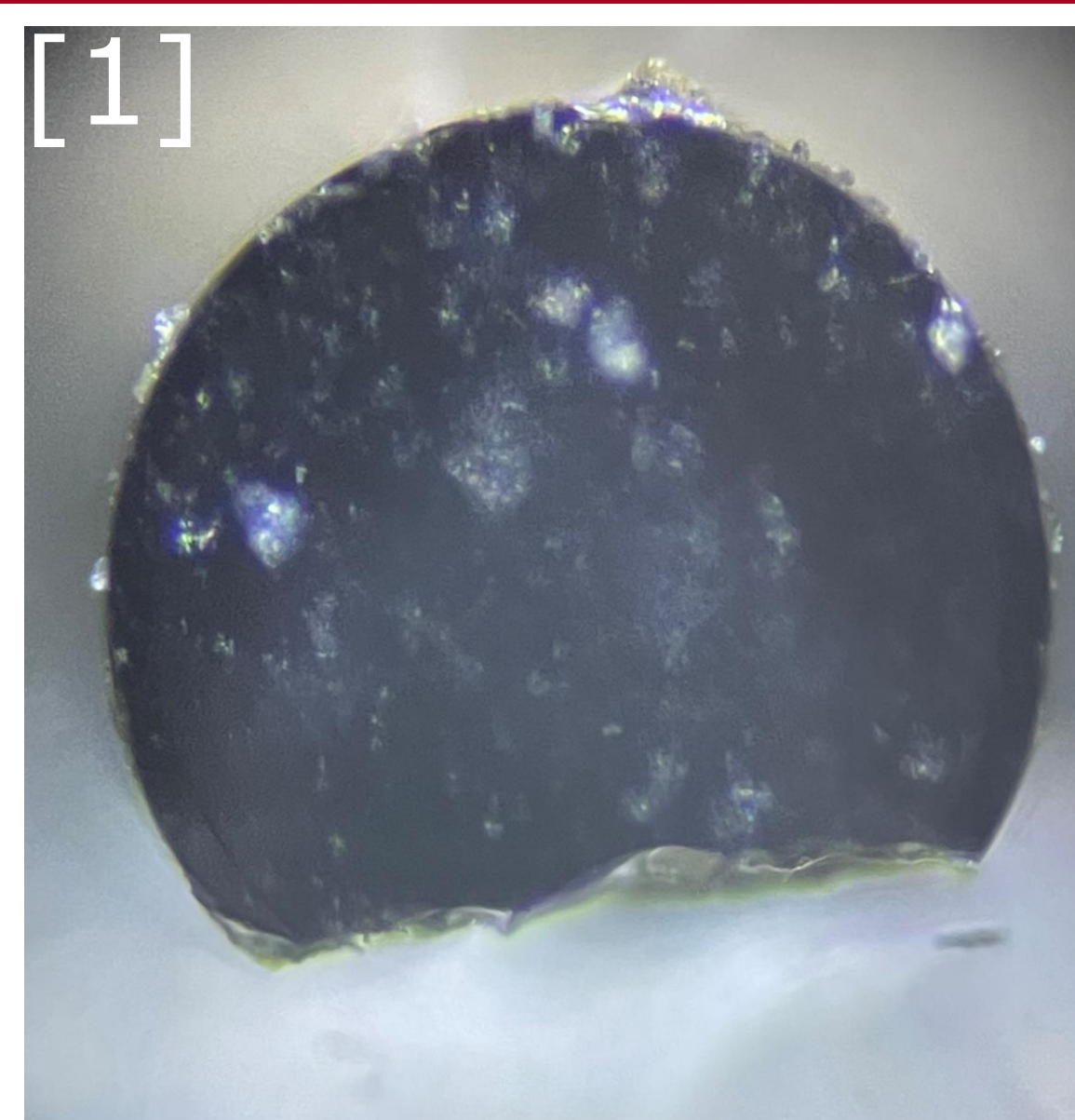
## Diagram of Fiber



## Motivation

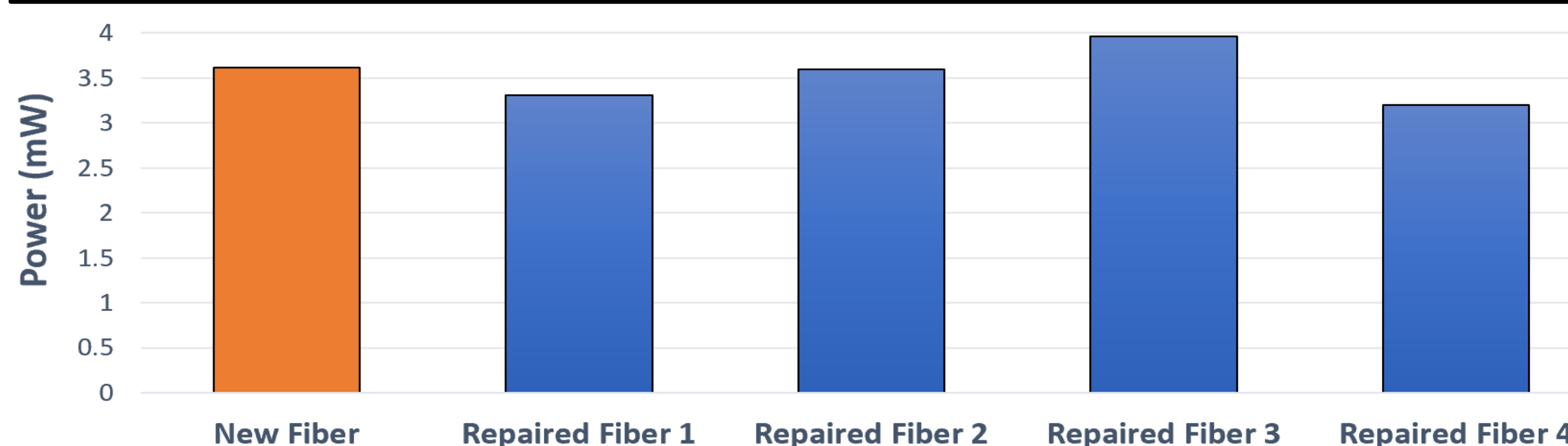
Fiber optic cables are essential pieces of equipment in many hutches and labs at LCLS. But, because of their fragility, they are often rendered inoperable. If we were able to repair these fibers easily, we could save money, time, and support our experiments better.

## Fiber Ends Before and After Repair



1. Chipped Fiber Creates Imperfect Mode and Reduces Power
2. Fiber Burnt by High Power Laser Allows Very Little Transmission
3. Brand New Fiber and Ideal Mode
4. Repaired Fiber and Mode

## Relative Coupling Efficiency



## Conclusions

### Deliverables

- Coupling Station
- Repair Station
- 7 Confluence Pages
- 7 Repaired Fibers

### Use Cases

- Testing in-coupling distance
- Testing focusing setups for hutches
- Testing coupling efficiency
- Inspecting damaged and repaired fibers and modes
- Repairing Damaged Fibers

## Documentation

I have created documentation in the form of several Confluence pages. For each process that I completed I created a how to guide with step-by-step instructions, pictures, and videos.

## Acknowledgments

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