

Proposal for New UV-Spectrum Probe for DSG's Reflectivity Test Station

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2023-08

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In the near future, JLab will be constructing several ring-imaging Cherenkov (RICH) detectors for the EIC and SoLID projects. Each detector has arrays of mirrors that focus the Cherenkov light to the detector electronics array. These mirrors must adhere to strict manufacturing specification, particularly for their reflectivity. To ensure the mirrors meet the required reflectivity specifications for light in the deep UV wavelength spectrum (~200 nm), they will be tested in DSG's reflectivity test station. Previously, through testing on-hand components and investigation into component specifications, it was determined that the on-hand Thorlabs RP26 reflectivity probe with reference leg is not suitable for long term use with UV-spectrum light. Because of this, DSG proposes modifying the test station to use various optical components to create a UV-resistant reflectivity probe.

The RP26 probe on-hand is specified for use with light whose wavelengths are greater than 250 nm due to the probe's optical fibers not being solarization- (or UV-damage-) resistant. Over time, the fibers in this probe will become more optically opaque for the light passing through it. This will cause later measurements to have different absolute measurements for the reference and measurement beams. To resolve this problem, it is proposed to replace the probe with a custom assembly comprised of a fiber collimation terminator, convex lens, and fiber adapter, Fig. 1.

With the proposed probe assembly, the output light from an optical fiber is collimated (otherwise the light will diverge) and directed to a mirror at some angle (ideally 45°). The light will then reflect off of the mirror to a convex lens that will focus the collimated light back to a point on the face of the output optical fiber.

Benefits of this set up are that only common optical components are used. This means that if a component breaks, it can typically be ordered and received within two weeks, as opposed to increased lead time for custom or non-stocked parts. Additionally, the probe allows measurements of reflectivity at an angle other than 90°, as is the standard practice for industry reflectivity measurements.

- **Previous test showed that DSG's RP26 reflectivity probe is not suitable for UV-spectrum measurements**

- Probe's optical fibers are not rated for low-wavelength UV light

- **DSG proposes using a custom assembly made up of common optical components to replace the RP26 probe**

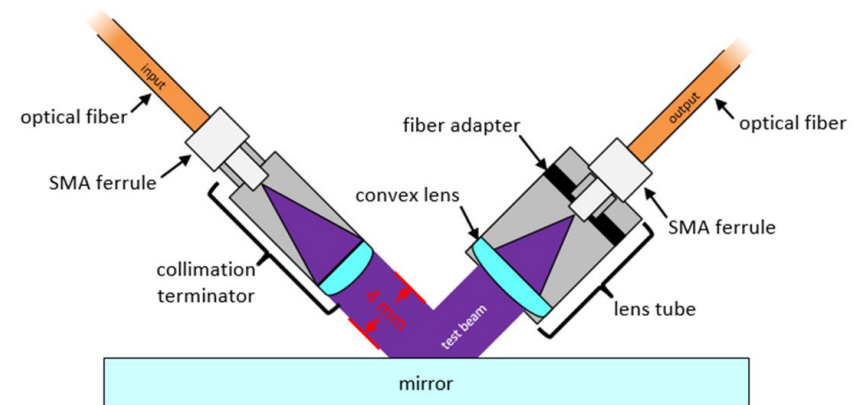


Fig. 1: Diagram of proposed UV-capable reflectivity probe.