

# OCEAN OPTICS XXIV

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<https://oceanopticsconference.org>

Tuesday, October 9

Poster Session 2

10:30–12:30

## **Poster 70**

### **ANALYSIS OF THE APERTURE WINDOW FOR THE NEW BB METER DESIGN**

We have been developing a new in situ meter for a direct accurate measurement of the backscattering coefficient  $bb$ . An important aspect of our new meter design is the entrance aperture to the detector; it requires what is generally referred to as a cosine collector. Various cosine collector designs have been described in the literature, but none have the accuracy, efficiency, and durability that we require for this new  $bb$  meter. Consequently, a new cosine detector geometry has been developed. It is basically a metal aperture on the surface of a clear quartz window that has a slight cylindrically shaped depression. With this design, photons incident on the detector aperture will pass through the water-quartz interface and into the quartz with a high efficiency that is relatively independent of the angle of incidence on the aperture. For the proposed design, the average transmission into the quartz would be 99.8% over all angles of incidence from  $0^\circ$  to  $90^\circ$  and peak-to-peak variations in the transmission across this range of angles of incidence would be less than 0.12%. Note that light scattered from the laser beam at  $90^\circ$  is incident on the detector aperture at a  $0^\circ$  angle of incidence, and backscattered light at  $180^\circ$  is incident at  $90^\circ$ . Consequently, all of the scattered light will be transmitted to the detector with approximately 99.8% efficiency. The theoretical analysis of this aperture design will be presented and a new improvement based on the thickness of the aperture plate will be described.

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