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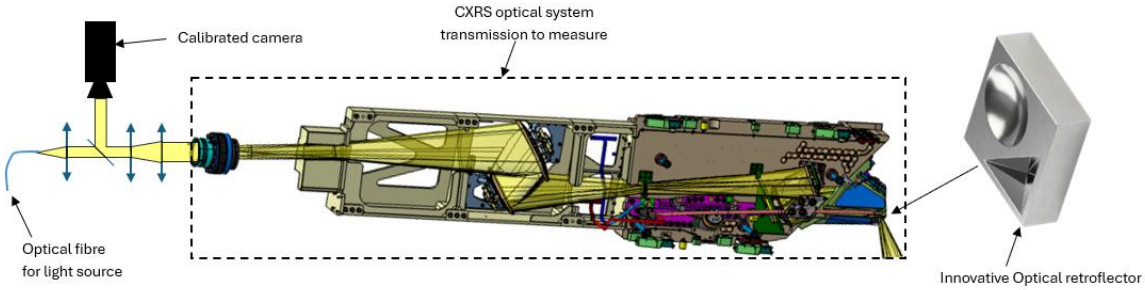
Optical Retroreflector for In-Situ Optical System transmission monitoring

Bertin Technologies has collaborated with F4E to develop expertise in retroreflector-based calibration methods for optical diagnostic systems operating in constrained or harsh environments. In many situations, permanently installing a calibrated light source is impossible or impractical due to environmental conditions, limited access, or cost. Conventional retroreflector approaches rely on long-term material reflectivity stability, which can drift over time and introduce biases.

The technology

Bertin Technologies' know-how is based on an innovative dual-shape retroreflector design combining two mirror geometries: one returns light after three reflections (angle cube principle), while the other produces scattering with a single reflection. This difference in reflection count, combined with different optical conjugation, enables simultaneous measurement of both the retroreflector's intrinsic reflectivity and the optical system's transmission — without any external calibrated source. The device is manufactured from a single material using a straightforward, reproducible process, and is adaptable to many optical configurations. It is compatible with visible, infrared, and radar wavelengths.



Advantages and Potential Applications

- Simultaneous measurement of retroreflector reflectivity and optical system transmission
- No in situ calibrated light source required: ideal for constrained, remote, or inaccessible installations
- Single-material device manufactured by a simple, reproducible process
- Compatible with visible, infrared, and radar wavelengths
- Adaptable configuration for various optical systems and integration constraints
- Reverse application possible: deposition monitoring via transmission loss measurement
- Suitable for high-radiation environments (nuclear, space) and other extreme conditions

This methodology applies to all areas where optical transmission efficiency needs to be monitored over time: nuclear environments, space and satellite systems, industrial furnaces, and any installation where access or cost make conventional calibration impractical.

Collaboration opportunities

Bertin Technologies is available for all requests and services interested in this know-how.

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