

Reduction of the viral load present in indoor environments, compatible with the presence of human beings.



MARKET NEED



- Enhances the capability of advanced instruments to perform tasks in **remote sensing, Earth observation, optical, and quantum communications**.
- **Reliable and resilient** solution for the **demanding conditions** of space missions, thanks to its liquid crystal-based design.

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STAGE OF DEVELOPEMENT

- The device is **TRL 9**, "Telecnological Readiness Level,".
- Actual system **proven** in operational enviroment.
- The **spin-off EYE4SKY** has been approved with INTA participation as partner for the **technology commercialization**.

POLARIZATION MODULATOR BASED ON LIQUID CRYSTALS

The Space Optics Department at INTA has developed the polarization modulators based on liquid crystals for the PHI and METIS telescopes onboard Solar Orbiter mission, in operation currently. These devices allow the analysis of the light polarization of an scene with **significantive lower mass, volume, power and cost** than the traditional systems. These features make them suitable for their use in **small satellites allowing performaces for Earth Observation and Communications systems only achieved before for large satellites**.

The polarization modulation has numerous applications. Among others is should be highlighted the remote sensing and optical communications applications. Some of them are characterization of aerosol particles in the atmosphere, health monitoring of soil and vegetation, target detection and mesasurement of Earth and Sun magnetic fields. Also the polarization control for Quantum Key Distribution (QKD) in quantum communication systems is other of the interesting applications.

The traditional polarization modulation systems consist of rotatory mechanism with a polarizing optical element as a polarizer o retarder plate. That produces that the systems are heavy, bulky, power consuming and with a high cost in order to guarantee the mechanism reability onboard space platform.

The polarization modulators based on liquid crystals use the mature and widely used tecnology for displays with new designs and processes in order to be robust in the harss space envieronment. Thanks to that, the **mechanisms or any mobile parts are avoided** and the actuation is done by the application of low voltages.

ADVANTAGES

- Elimination of mechanisms and moving parts, reducing complexity, the risk of mechanical failures, and maintenance costs in space systems.
- **Reduces mass, volume, power consumption, and cost**, enabling new capabilities for small satellites, as well as in complex instruments and systems.