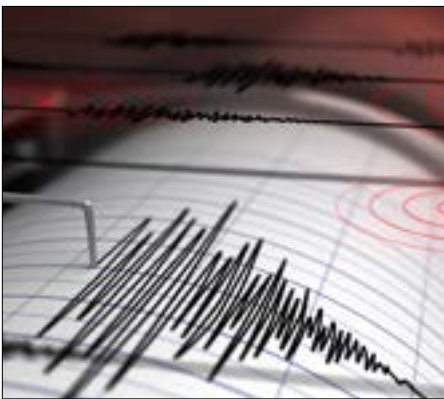


PRECISION LASER INCLINOMETER

A novel seismic monitoring technology capable of high precision sensing of ground inclination and vibration, which allows for faster seismic event identification and alerts.

The Precision Laser Inclinator (PLI) is a compact instrument capable of measuring ground oscillations and deformations of all kinds with a very high signal-to-noise ratio. This feature allows for better detection of smaller seismic events, as well as the early signals of larger seismic events – making it a potentially life-saving technology if applied within earthquake-early-warning systems.

Unlike common seismometers, its working principle is based on laser light reflection on the surface of a liquid mirror. This allows for the measurement of minimal inclination changes and perturbations on the liquid surface. Its outstanding precision makes it capable of detecting a 24-picometer displacement at a distance of 1 m, from very low to high frequencies. This level of sensitivity is so high that it is the range used by scientists to filter Newtonian Noise in the search for gravitational waves, such as those at the VIRGO experiment.



AREA OF EXPERTISE

- Detectors

IP STATUS

- In development at CERN and the Joint Institute for Nuclear Research (JINR) since 2010. It stemmed out of the necessity to reduce the dependence of the luminosity of particle colliders on seismic perturbations.
- Currently, the associated IP is owned by both CERN and JINR
- Two patents have been granted in Russia

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Find out more at:

kt.cern

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MAIN FEATURES

- Measures ground inclinations and oscillations on two axes.
- Outstanding precision: detection of picometer-level displacements at a distance of 1 meter.
- Sensitivity: $2.4 \times 10^{-5} \mu\text{rad}/\text{Hz}^{1/2}$, for frequencies between 1 mHz and 12.4 Hz.
- Compact dimensions: 40x40x20 cm³ (R&D underway to reduce the footprint by a factor of 2).
- The liquid container is free from resonances.
- The moderate vacuum construction minimizes the influence of air temperature gradient and reduces light scattering in air.

POSSIBLE APPLICATIONS

- Seismic monitoring and earthquake early warning systems
- General geological monitoring (volcanoes, landslides, ice melt)
- High-precision science research
- Civil engineering



technology

Knowledge Transfer
Accelerating Innovation