

Advancements in Rasnik readout

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The Rasnik is originally a 3-point alignment system under continuous development since 1993 where it was first used to align the muon chambers of the ATLAS experiment at CERN.

A light source illuminates a special mask which is projected on a CMOS sensor using an objective/lens. This image of the mask is analyzed to calculate the absolute position. This allows us to find displacements on the axes which are perpendicular to the optical axis without any coupling between them, with the same noise floor in all frequencies. Any motion of the mask, objective or pixel sensor is picked up as image motion. In the recent years, the advancement has allowed the spatial resolution down to $7 \text{ pm}/\sqrt{\text{Hz}}$. These features can be exploited for the future GW detectors where isolated optical benches can be interlocked to reduce the differential motion between them in degrees of freedom inaccessible to other sensing solutions.

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