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## Compensating for the effects of refraction in photogrammetric metrology

As part of the recently completed LUMINAR project, lead by the UK's National Physical Laboratory (NPL), the 3DIMPack group at University College London (UCL) was given the task of evaluating and correcting the effects of refraction on photogrammetric metrology applications.

Refraction causes light rays to bend. This results in pointing errors which potentially can be corrected. Simulations suggest that the effects over short ranges are small, and possibly negligible, but potentially significant over longer ranges, e.g. 10m - 30m. These are certainly found in application areas such as aircraft assembly and therefore deserve attention.

Refraction errors are dominated by thermal changes in the atmosphere. They have been evaluated in some detail in geodesy, and to a much lesser extent in photogrammetry. General atmospheric refraction in metrology applications has not been investigated in detail before.

This paper summarizes the work in the LUMINAR project and outlines its further potential application in an ongoing, parallel project, the Light-Controlled Factory. Currently a level of correction seems achievable if real-time temperature sensing in the local measurement environment is possible. Here the authors would like to engage with the IWAA to locate suitable applications in accelerator alignment.

### Summary

An overview of work by University College London to evaluate and correct the effects of atmospheric refraction in photogrammetric metrology applications.

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