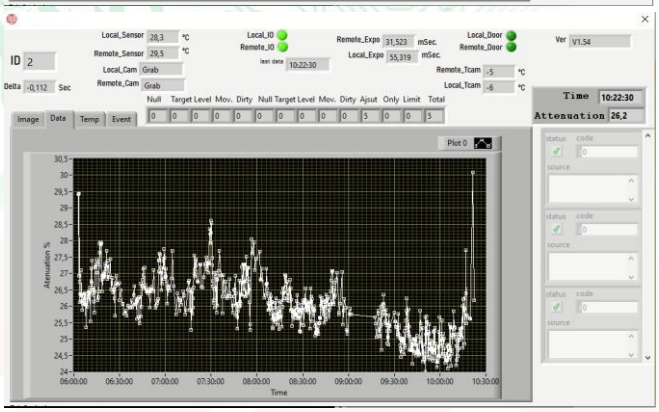
APPLICATION NOTE

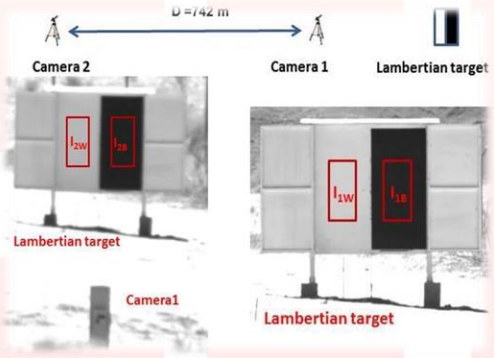
Solar attenuation measurement system

An innovative measuring method based on digital images and Lambertian target



In solar plants, the measurement of solar attenuation based on solar extinction is important since it is the main cause of energy loss. The aim of this measurement system is to measure this energy in the bandwidth of 400 - 1000 nm with an accuracy better than an absolute ±2%.

The system consists of positioning the cameras one behind the other at a large distance, both taking images of one target. The system will provide the diffuse radiance coming from the target by measuring the intensity levels of the digital images. The difference of intensity of these images will be due to the attenuation of the radiation in the path between the two cameras.



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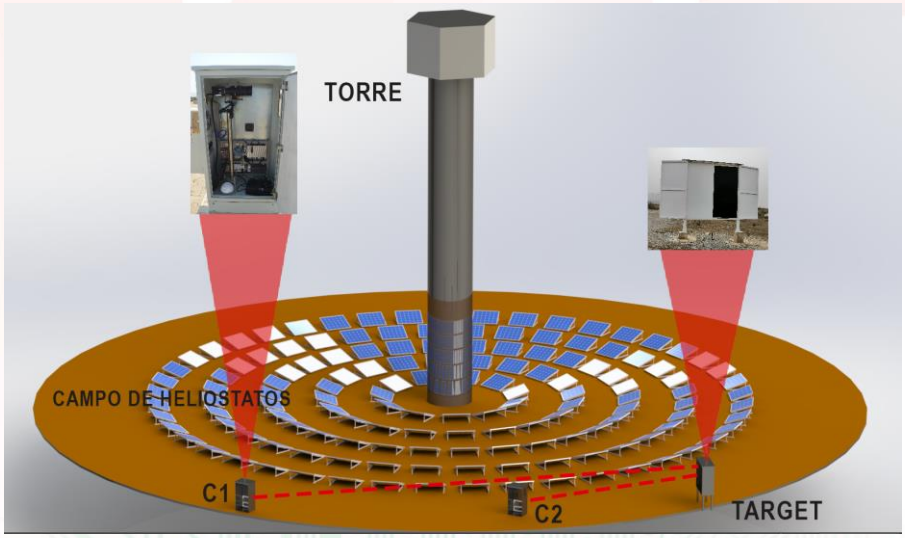
The system can take simultaneous images of the same target at different distances using two identical optical systems with digital cameras and suitable lenses. The Lambertian target plays an important role for this measurement system since the position of the cameras and the angles related to the target can never be known for sure at such large distances.



- A dedicated software always selects the same areas of the target from the two cameras, then the luminous intensity is measured.

- The difference in intensity or light attenuation between both images, provides the attenuation for the experimental distance, being β_{Ext} the attenuation coefficient considering both, the absorption and scattering mechanisms, and dependent on humidity, aerosols and particle concentration in the atmosphere.

bcb
Fernando el Católico 11
28015 Madrid
Tel. (+34) 91 758 0050
info@bcb.es
www.bcbingenieria.com

bcb México
Homero 538-303
Polanco V sección
Del. Miguel Hidalgo
11560 Ciudad de México
Tel. (+52) 55 9183 0547 Ext. 7547
Sucursal Monterrey Tel. (+52) 81 1041 2616
info@bcbmex.com
www.bcbingenieria.com