U.S. Department of Energy
HelioCon
Heliostat Consortium for Concentrating Solar-Thermal Power

Heliostat Consortium Seminar Series

Brought to you by the Resource, Training, and Education (RTE) topic area

Tucker Farrell
Research Engineer, National Renewable Energy Laboratory
Tucker.Farrell@nrel.gov

Stephanie Meyen
Researcher, National Renewable Energy Laboratory
Stephanie.Meyen@nrel.gov

Host: Dr. Rebecca Mitchell, National Renewable Energy Laboratory

Title: Solar Mirror Reflectance and Standardized Reporting

When: June 12th 9-10 AM MDT

Zoom:
https://nrel.zoomgov.com/j/1618791253

Abstract:

About two decades ago, the commercialization of concentrating solar power plants became feasible under the premise, that cost reduction and performance improvements would be achievable to be competitive with other renewable energy technologies. A major factor in ensuring high performance of while implementing efforts in cost reduction is the ability to reliably evaluate said performance. Knowing the solar weighted reflectance of a solar collector or heliostat plus all optical and opto-mechanical errors including the specularity of the mirror, one can model the flux distribution on the receiver, which is the ultimate metric for performance. While an official IEC standard for reflectance characterization is in progress but not yet released, there is a widely accepted measurement guideline and a body of work on reflectance measurement and modeling available. The speakers of this seminar will discuss 1) A definition and explanation of reflectance parameters; 2) The status of standardization efforts and available instrumentation; 3) A description of a best practice measurement procedure and dependencies on application (e.g. material comparison, soiling or degradation analysis); 4) A recommendation to use a generalized, automated data processing and reporting code.

Bios:

Tucker Farrell has been a research engineer at NREL since 2020. He has contributed to the development of optical tools used to assess optical quality and heliostat performance metrics. His work began with flight planning for autonomous UAS and has progressed to include learning and computer vision techniques for image analysis. He also works in optical material characterization, accelerated aging, and life cycle modeling for solar reflectors, absorbers, and lately, particles. Finally, he's one of NREL's 3 operators of our 10-kW solar furnace.

Stephanie Meyen holds a Master's degree in optical engineering and has joined NREL in early 2024 as a researcher focusing on heliostat qualification metrology and standardization. Her previous experience in CSP research spans the time between 2005 to 2014, working at the DLR Solar Research Institute in Germany and at the Plataforma Solar de Almeria in Spain. At the time, Mrs. Meyen was a critical team member during the establishment of two main CSP quality assurance laboratories, the QUARZ-Center and the OPAC laboratory. During the recent decade, Mrs. Meyen explored the US space and astronomy industry working with space-bound LIDAR systems and high precision metrology for giant telescope mirrors. However, the energy crisis prompted her to return to the CSP community.