



Heliostat Consortium Seminar Series

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Host: Dr. Rebecca Mitchell

Title: Fields of Twisting Heliostats for Direct Air Capture and Making Syngas and Cement

When: January 17th 1-2 PM MST

Zoom:
<https://nrel.zoomgov.com/j/1609580897>

Abstract:

Concentrated sunlight has the potential for manufacturing syngas and cement, and also for direct air capture of CO₂. Small scale demonstrations have been made, mostly in Europe and Japan, of concentrating sunlight to reach the required reaction temperatures, as high as 1,500°C. However, for commercial viability, these high temperatures must be reachable in summer and winter, through the day, not just for high DNI and small angles of incidence. To address these requirements, Angel's team has developed a new kind of heliostat to achieve the maximum possible concentration set by thermodynamics. It does this by having the reflector shape twist automatically to eliminate the astigmatic aberration that prevents fixed-shape heliostats from imaging the solar disc. We show different configurations of heliostat field and secondary reflector that allow high reaction temperatures to be maintained, even at 500 DNI and solar elevation of 26 degrees.

Bio:

Roger Angel is a Regents Professor at the University of Arizona's Department of Astronomy and College of Optical Sciences. He is a member of the National Academy of Sciences, a Fellow of the Royal Society, and a recipient of a Kavli prize and a MacArthur Fellowship. He has brought about radical changes in telescope and optical technology for several decades. He founded and directs the Steward Observatory Caris Mirror Lab. His pioneering work in the use of optical fibers and adaptive optics in astronomy has led to the construction of some of the world's largest optical telescopes and their instrumentation. In recent years Angel has worked also on solar energy technologies using concentrating optics, most recently on adjustable-shape heliostats to concentrate solar energy to the very high temperatures needed to make fuels and cement.