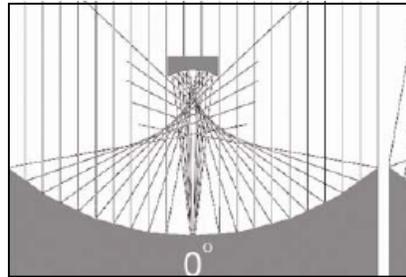


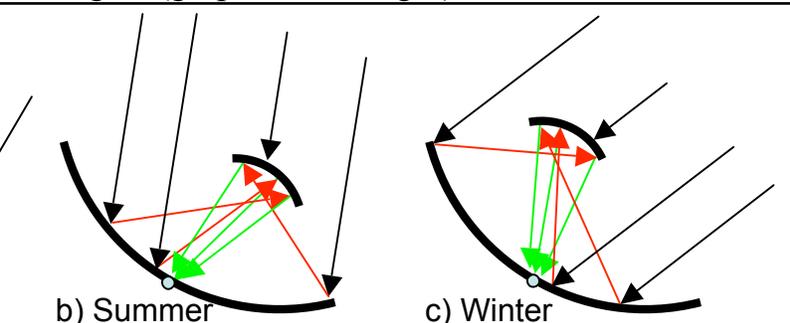
Concentrator Design, Passive Solar Heating of Swimming Pools, and

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Abstract: Writing optimization code for multiple ray-tracing software, we optimized a concentrator. Light is first incident onto a stationary primary mirror. The reflected light is incident onto a smaller, secondary mirror, which focuses the light onto a target. Concentrations on the order of 60 solar equivalents over a broad range of angles (graph, below right)



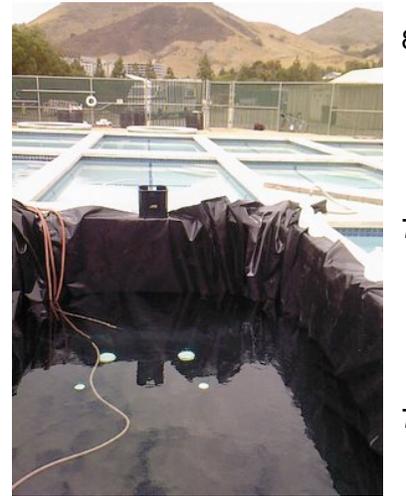
Ray tracing results for incident solar concentrations on the target center



(b) Light strikes a stationary primary trough mirror of circular cross-section (red rays) are further focused by a movable, smaller secondary mirror (blue circle). If the surface is optimized for equinox, summer light is focused well onto the target.

Results: The average efficiency over a broad range of angles is slightly above 50%. Because tracking paths are spaced far enough apart, our technology may be cost-effective. It remains to be seen if the solar tracking mechanism reduces construction costs.

Swimming Pool Abstract: While covering the swimming pool with black inserts to absorb more sunlight resulted in a 1°C temperature increase and small financial savings, we used a transparent pool cover to eliminate evaporative heat loss, resulting in a significant temperature increase (graph, far right) and energy savings. Experiments were done by monitoring the temperatures of pools at Poly's National Pool Industry Research Center (near San Luis Obispo). The experiment allowed the temperature of the pool to increase. In another experiment, a heater maintained the temperature in both pools, allowing the measurement of solar heat gain in a control pool.



EV Abstract: Low driving range is credited with the poor reputation of electric cars. Higher range cars weigh too much and are too expensive due to the increased need of batteries. However, 95% of cars driven in the US travel less than 40 miles. Our cost analysis (right) indicates that the costs of an electric car are less than that of a near identical gasoline car for ranges less than 100 miles at present prices. Additionally, we found the effective stored energy of an electric car to be higher than that of a near identical gasoline car for ranges less than 100 miles. Unlike other calculations, we

