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Star Power: New Ways to Harvest Energy from our Sun

Introduction:

We all use energy to power our lives—to heat our buildings, to drive our cars, to cook our food, to send our emails. Most of this energy comes from fossil fuels (oil, natural gas and coal), but these energy-rich sources have several drawbacks. Coal mining requires destruction of large swaths of land, and oil drilling gone awry can be catastrophic—think of the Gulf Coast! Burning these fossil fuels to harvest energy releases pollutants that contribute to global warming. Fortunately, there are creative minds investigating alternative ways to harvest energy that can be cheaper and more sustainable! Today we will hear about two cutting-edge approaches to 'capture' energy from sunlight, and convert it into electricity that we can use in our homes. Stay tuned to learn about the challenges and potentials of harvesting energy from our sun!

Speakers:

Kevin Beier is currently a PhD student at Harvard University, conducting biological research on brain circuitry. He received his BS from the University of Wisconsin-Madison in 2007. Throughout his time in college, he has been involved in many student groups aimed to reduce waste/pollution and conserve energy on and off campus.

Jacob Krich is a theoretical physicist working on novel and somewhat crazy ideas for improving photovoltaics. He is a Ziff Environmental Fellow of the Harvard University Center for the Environment, conducting postdoctoral research in the Harvard Department of Chemistry and Chemical Biology. He received his PhD in physics from Harvard in 2009.

Dan Recht is a fourth-year Ph.D. student in applied physics at Harvard's School of Engineering and Applied Sciences. He researches ways to improve existing materials to make better light detectors and solar cells. Dan is currently helping to teach a course on climate science and energy technology geared toward non-scientist undergraduates at Harvard.

Glossary:

Energy: the capacity to do work. Energy can be *converted* between many forms (electricity, heat, motion, etc) but it cannot be created or destroyed. Thank you thermodynamics!

Electron: a small, negatively charged particle, which is a component of an atom. Electrons can absorb and release energy, and they will also move towards a positive charge! Very convenient!

Electricity: energy provided by moving electrons. For example, electrons can take chemical energy from a battery, flow through a wire, and give that energy to light a light bulb.

Fossil fuel: an energy-rich source derived from prehistoric materials that are now in the form of oil, natural gas, or coal.

Light: energy in the form of photons (or electromagnetic radiation). Each photon has a particular amount of energy, which corresponds to its 'color.' For example, red light is composed of lower-energy photons than blue light.

Parabolic mirror: A reflective surface curved so that any light that hits the mirror will be reflected towards a single point (called the focal point) at the center of the curve.

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