

Researchers film protein quake for the first time

27 August 2014, by Anne Hansen



One of nature's mysteries is how plants survive impact by the huge amounts of energy contained in the sun's rays, while using this energy for photosynthesis. The hypothesis is that the light-absorbing proteins in the plant's blades quickly dissipate the energy throughout the entire protein molecule through so-called protein quakes. Researchers at DTU Physics have now managed to successfully 'film' this process.

Both plants, algae and bacteria contain light-absorbing proteins which play a role in [photosynthesis](#) and thus how the organisms produce energy. However, it has long been a mystery how the organisms survive the sun's powerful rays while at the same time harvesting solar energy.

The [hypothesis](#) is that the light-absorbing proteins in the plants' blades quickly dissipate the energy throughout the entire protein molecule through quakes. Researchers at DTU Physics have now managed to successfully confirm the hypothesis.

Together with researchers from Stanford University, Tim Brandt van Driel and Kasper Skov Kjær from DTU Physics have investigated the dynamics of a protein from a bacterial

photosynthesis when exposed to sunlight[SFK1] . Using a [free electron laser](#) that sends impulses lasting less than a femtosecond, the researchers have successfully filmed the so-called protein quakes which so far have just been a theoretical explanation of how the proteins survive the solar energy bombardment.

During a protein quake, the [protein structure](#), evenly and harmlessly distributes the solar energy across the entire protein.

In addition to confirming the hypothesis about the proteins' survival strategy, the experiment is also part of the method development for examining light absorption by photosynthesis proteins and electron transfers, which are again relevant for utilising [solar energy](#) in, for example, solar cells and other light-absorption systems.

The ground-breaking results were published in the journal *Nature Methods* on 10 August 2014.

More information:

[www.nature.com/nmeth/journal/v ... full/nmeth.3067.html](http://www.nature.com/nmeth/journal/v...full/nmeth.3067.html)

Provided by Technical University of Denmark

APA citation: Researchers film protein quake for the first time (2014, August 27) retrieved 16 September 2019 from <https://phys.org/news/2014-08-protein-quake.html>

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