



Münchener Physik- Kolloquium

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Dieses Semester findet das Kolloquium online statt: <https://tum-conf.zoom.us/j/93234766313>

Photovoltaic technologies as key pillar to a solution of the urgent climate crisis

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Monday, 6 July 2020, 17:15 h

<https://tum-conf.zoom.us/j/93234766313> Meeting-ID: 932 3476 6313 Passwort: Kolloquium
Software bitte möglichst vorab installieren.

The weekly demonstrations of school children in the Fridays for Future movement, supported by Parents for Future, Scientists for Future and similar movements, is putting a constant, bright spotlight on the fact that the world is currently heading full speed like Lemmings towards a cliff with respect to the earth climate, that we might reach as early as 2030. More and more politicians and opinion leaders worldwide get aware of this clear and eminent danger for our climate system, that has been carefully studied by scientists in the IPCC.

The need to decarbonize emissions not only from our energy sector, but as well our transportation and industry sectors, requires rapidly implementing solutions on a global scale. We cannot wait till nuclear fusion might help to generate enough emission-free power, similarly, even rapid build-up of nuclear fission plants would come too late.

The needed, urgent transformation of our energy system to efficient use of ultimately 100 % renewable energy is now starting seriously. This will be based on all kinds of renewable energy, but solar and - on a second place - wind energy will provide the two most important pillars. This is a disruptive process, whose widespread impact can hardly be overestimated.

In the last few years, photovoltaic (PV) conversion of the sun's nuclear fusion energy has become cost-competitive with electricity produced by oil-fired power plants, new nuclear power plants, and diesel generators. Today, harvesting solar energy by PV is in many areas of the world the lowest-cost way to produce electricity. Global PV production capacity is expected to further double and triple from the current level of 100 GW/a, bringing global PV installations soon well into the Terawatt range. There seems to be no limit for the possibilities of a rapid build-up of power production based on solar photovoltaics.

A key factor for the needed further growth of renewable energy supply will be continuous technology advances in many areas, such as batteries, resulting in higher efficiencies at reduced cost. In addition, for many applications in densely populated areas cell efficiency will be even more important than lowest cost, to optimize the energy harvest from a given area.

In photovoltaics, crystalline Silicon technology currently represents more than 90 % of the global PV market. This well-known technology will still allow many technological advances, transitioning from the conventional back-surface-field (BSF) to the Passivated Emitter and Rear Contact (PERC) and then to higher-efficiency technologies. These will be introduced in the coming years, aimed at higher efficiencies at reasonable cost. However, for crystalline silicon this development is approaching a glass ceiling of 30 % efficiency, that is valid for all single-bandgap semiconductor materials. New approaches for even higher efficiencies require heterojunctions of materials with different bandgaps. Several promising approaches in this exciting field will be discussed, including heterojunctions on silicon, that allow to combine well-established large-scale Silicon PV technology with new technologies, such as low-cost III/V or Perovskite layers.

Student event: Meet the speaker

We invite you to a **student-only** discussion-round with Prof. Dr. Eicke Weber before his Munich Physics Colloquium talk.

Be curious and feel free to ask any question.

Monday, 6 July 2020, 16:00 h,

more information: <https://www.moodle.tum.de/course/view.php?id=57309>

