Physikalisches Kolloquium

Institut für Optik und Atomare Physik

Prof. Dr. Fritz Wagner

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"Transition in energy supply technologies: A general assessment"

Global warming demands a nearly complete replacement of the present energy supply technologies along a tight time frame. Only a few technologies allow a CO2-free electricity and energy supply and meet the needs as defined by the IPCC activity. These are nuclear fission with new approaches and smaller units, nuclear fusion, which, if successful, will only be available towards the end of the century, the use of fossil fuels, whereby CO2 must be separated and stored (carbon capture and storage, CCS technology) and finally renewable energies in their different forms. The three dominant forms of renewable energies - wind power, photovoltaic (PV) power and bioenergy - are characterized by a low energy density and - the first two forms - fluctuating generation. I will present mostly system analyses and try to address the following questions:

Integration of fluctuating power at increasing levels; the backup needs and the amount of surplus production; characteristics of surplus production with relevance for its use; the role of storage and its economics; the potential of demand-side-management; the wind, PV and biomass potential of Germany in comparison to the consumption in all energy sectors; possibilities of future cross-border energy exchange. Finally, I will try to draw conclusions on the German experience with the "Energiewende".

Moderation: Prof. Dr. A. Bradshaw

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