

Working Group on Energy Arbeitskreis Energie (AKE)

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Programmes of the Energy Working Group (Arbeitskreis Energie, AKE) at the Spring Conferences of the DPG aim at providing an overview of major ongoing developments towards a sustainable energy supply and use. Major strands of energy R&D and technology in the physical, chemical, biological and geological disciplines are being presented.

A first focus of this year's programme is on nuclear fusion where first significant results from the large Stellarator W7-X and developments at the National Ignition Facility (Livermore, USA) (AKE 1) will be reported. Nuclear fission will be phased out in Germany shortly (while internationally a strong development is being pursued). This requires technological developments and societal decisions for decommissioning of nuclear power plants and for the subsequent storage of radioactive waste (AKE 3).

Wind and Photovoltaics are on the way of providing the major share of electrical energy supply. Being fluctuating they require back-up, novel grid technologies (AKE 10), large storage systems based on chemical energy (PV XI by Ferdi Schüth) and/or involving underground (geological) storage (AKE 11) as well as integration (coupling) of all sectors of energy use (AKE 6). While an impressive development is continuing with Si-based photovoltaics, multi-band thin-film technologies based on novel materials (AKE 4) hold promises to win market shares. Wind technologies (AKE 6, SYIT) are progressing at a rapid pace. The dominant wind potential being off-shore and here located beyond shallow coastal waters, floating wind turbines gain increasingly attention (AKE 9).

Despite the advances in renewable technologies they remain uncompetitive as long as societal and environmental (external) costs of energy are not internalized, e.g. via a carbon tax (AKE 6).

Geothermal Energy (AKE 11) and Bio-energy (AKE 8) are among the few renewable energy sources with steady non-fluctuating availability. While biomass based energy dominates the renewable energy market, the development of synthetic (solar)fuels, in particular for mobility applications, is progressing along different tracks (AKE 5, AKE 12, see also proceedings of last year's presentations). Furthermore, a perspective for sustainable hybridelectric aircraft propulsion is being investigated (AKE 2).

A major motivation of energy R&D is the mitigation of global climate change. A session of this year's programme is devoted to discuss the far reaching consequences of ice melting in the Antarctic and the complex issue of climate governance (AKE 13).

Novel technologies enter the renewable energy market via start-ups as well as established industry. In a joint symposium (SYIT) with jDPG and AIW examples are presented: a novel approach to hydrogen technologies with a liquid organic hydrogen carrier (LOHC), energy-related meteorological services and new technologies for wind turbines. The role of physicists in energy related industries is being addressed in an ensuing panel discussion followed by an open get-together.

The sequence of sessions is in part a consequence of constraints in the availability of the speakers.

The annual meeting of the AKE will be on March 21/22 2019 in Bad Honnef. The next election of the board will be during the AKE meeting in Bad Honnef on April 3, 2020.

Overview of Invited Talks and Sessions

(Lecture room U A-Esch 1)

Plenary Talk

PV XI	Wed	9:00– 9:45	U Audimax	Chemical Energy Storage: a Key Element for a Sustainable Energy Future — ●FERDI SCHÜTH
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Invited Talks

AKE 1.1	Mon	10:30–11:00	U A-Esch 1	Wendelstein 7-X - Erste Ergebnisse auf dem Weg zum stationären Betrieb — ●TORSTEN STANGE, DAS W7-X TEAM
AKE 1.3	Mon	11:15–11:45	U A-Esch 1	Inertial Confinement Fusion - will Fast Ignition provide new progress? — ●MARKUS ROTH
AKE 2.1	Mon	11:45–12:15	U A-Esch 1	Innovation in aviation: the role of hybrid-electric aircraft — ●ANDREAS REEH
AKE 3.1	Mon	14:00–14:30	U A-Esch 1	Radioactive waste in Germany - current situation and future perspectives — ●CLEMENS WALTHER
AKE 3.2	Mon	14:30–15:00	U A-Esch 1	Decommissioning of nuclear facilities — ●THOMAS WALTER TROMM
AKE 3.3	Mon	15:00–15:30	U A-Esch 1	The Nobel Prize in Physics 2018 and future applications for Laser-Driven Neutron Sources — ●MARKUS ROTH
AKE 4.1	Mon	15:30–16:00	U A-Esch 1	Photovoltaics: perspectives for new materials — ●SUSAN SCHORR
AKE 5.1	Mon	16:15–16:45	U A-Esch 1	Wind und Wasser zu Ammoniak - maritimer Kraftstoff und Energiespeicher für eine emissionsfreie Zukunft — ●ANGELA KRUTH
AKE 6.1	Mon	16:45–17:15	U A-Esch 1	Decarbonization of the European energy system with strong sector couplings — KUN ZHU, MARTA VICTORIA, TOM BROWN, GORM B. ANDRESEN, ●MARTIN GREINER
AKE 7.1	Tue	16:15–16:45	U A-Esch 1	Die Energiewende geht in die nächste Phase - wichtige Merkmale der künftigen Energieversorgung — ●CYRIL STEPHANOS
AKE 7.2	Tue	16:45–17:15	U A-Esch 1	Die Rolle der Fernwärme bei der Umsetzung der Energiewende — ●MARCEL KRÄMER
AKE 7.3	Tue	17:15–17:45	U A-Esch 1	WindNODE - Das Schaufenster für intelligente Energie aus dem Nordosten Deutschlands — ●MARKUS GRAEBIG
AKE 8.1	Wed	10:30–11:00	U A-Esch 1	Bioenergie in Deutschland: Historie, Stand und Perspektiven — ●MICHAEL NELLES
AKE 9.1	Wed	11:00–11:30	U A-Esch 1	Floating Offshore Wind - A state of the art review — ●FRANK ADAM
AKE 10.1	Wed	11:30–12:00	U A-Esch 1	Wege zu einer sicheren und stabilen voll-regenerativen Elektrischen Energieversorgung — ●HARALD WEBER
AKE 11.1	Wed	14:00–14:30	U A-Esch 1	Potentiale und Möglichkeiten der untertägigen Energiespeicherung — ●SEBASTIAN BAUER, BO WANG, JENS OLAF DELFS, WOLF TILMANN PFEIFFER, CHRISTOF BEYER
AKE 11.3	Wed	14:45–15:15	U A-Esch 1	Numerical modelling of shallow geothermal energy exploration process — ●HAIBING SHAO
AKE 12.1	Wed	15:15–15:45	U A-Esch 1	Photocatalysis - a powerful tool for the generation of Sun Fuels from Water and Carbon Dioxide? — ●HENRIK JUNGE
AKE 13.1	Wed	16:15–16:45	U A-Esch 1	The far reach of ice-shelf thinning in Antarctica — RONJA REESE, HILMAR GUDMUNDSSON, ANDERS LEVERMANN, ●RICARDA WINKELMANN
AKE 13.2	Wed	16:45–17:15	U A-Esch 1	Globale Klima-Governance: wie wird es nach mittlerweile 24 UN-Klimakonferenzen weitergehen? — ●FELIX EKARDT

Invited talks of the joint symposium SYIT

See SYIT for the full program of the symposium.

SYIT 1.1	Thu	10:30–11:10	U A-Esch 1	LOHC - wie Wasserstoff zum flüssigen Treibstoff bei Raumtemperatur wird — ●CORNELIUS VON DER HEYDT
SYIT 1.2	Thu	11:10–11:50	U A-Esch 1	Energiewende können Physiker auch ?! — ●MATTHIAS LANGE
SYIT 1.3	Thu	11:50–12:30	U A-Esch 1	Windenergietechnik als Arbeitsgebiet für Physikerinnen und Physiker — ●UWE RITSCHEL

Sessions

AKE 1.1–1.3	Mon	10:30–11:45	U A-Esch 1	Nuclear Fusion
AKE 2.1–2.1	Mon	11:45–12:15	U A-Esch 1	Mobility: Hybrid Electric Aviation
AKE 3.1–3.3	Mon	14:00–15:30	U A-Esch 1	Decommissioning of Nuclear Facilities and Final Repository
AKE 4.1–4.1	Mon	15:30–16:00	U A-Esch 1	Photovoltaics

AKE 5.1–5.1	Mon	16:15–16:45	U A-Esch 1	Mobility: Synthetic Fuels
AKE 6.1–6.3	Mon	16:45–17:45	U A-Esch 1	Intermittent Renewable Energy Supply
AKE 7.1–7.3	Tue	16:15–17:45	U A-Esch 1	Sector Coupling
AKE 8.1–8.1	Wed	10:30–11:00	U A-Esch 1	Bioenergy
AKE 9.1–9.1	Wed	11:00–11:30	U A-Esch 1	Wind Energy
AKE 10.1–10.2	Wed	11:30–12:15	U A-Esch 1	Distributed Energy Generation, Electrical Grids
AKE 11.1–11.3	Wed	14:00–15:15	U A-Esch 1	Geological Energy Storage and Geothermal Energy
AKE 12.1–12.2	Wed	15:15–16:00	U A-Esch 1	Artificial Photosynthesis, CO₂-Reduction
AKE 13.1–13.2	Wed	16:15–17:15	U A-Esch 1	Climate Change