PARLPV

Program

Workshops Utrecht
25 – 27 February 2020

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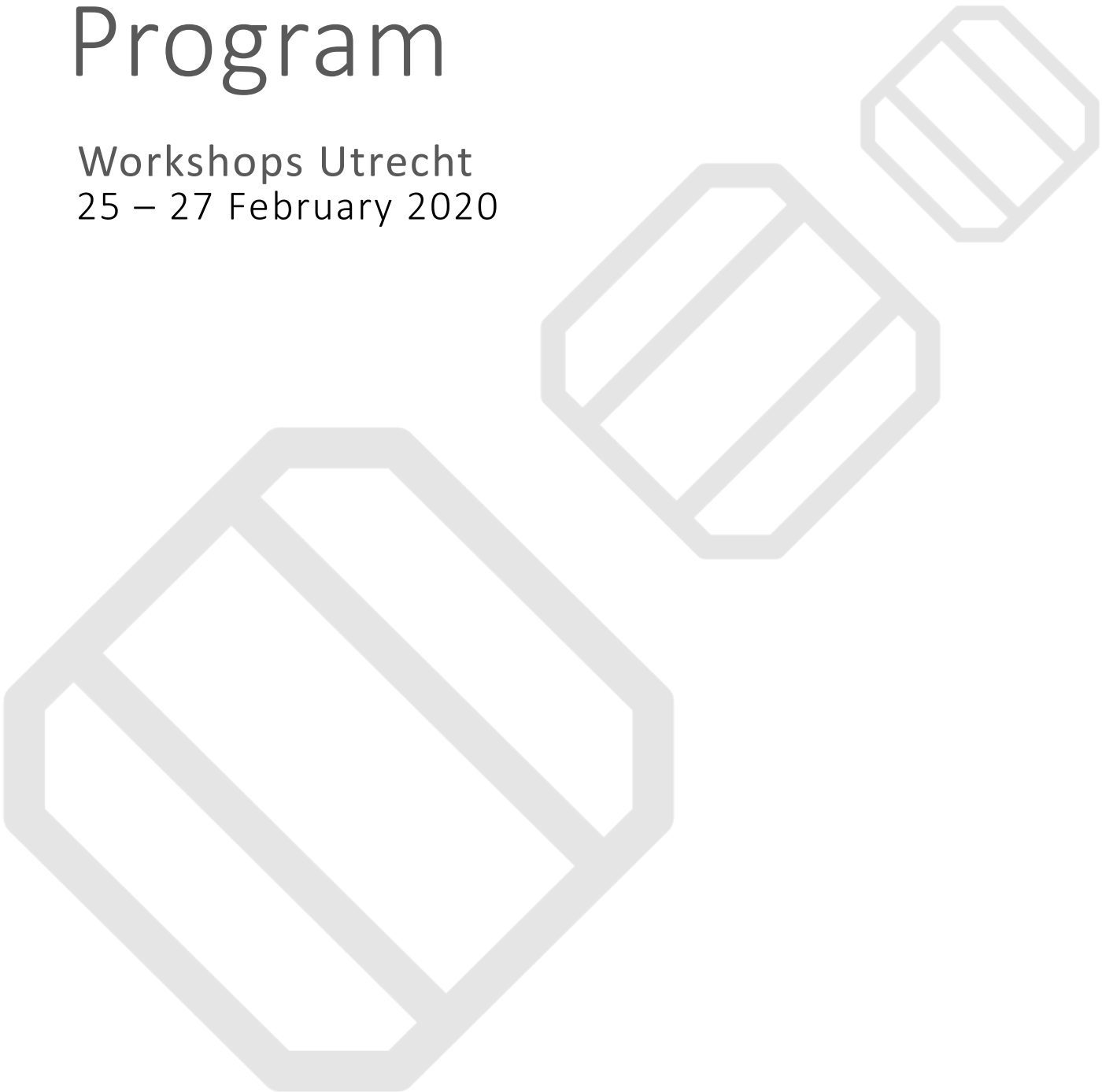

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Overall program 24 - 27 February 2020

Monday 24 February:

9:00 – 16:00 MC4 meeting

Tuesday 25 February

12:00 lunch

13:00 – 14:30 **plenary meeting**

15:00 – 17:00 five parallel WG workshops

Wednesday 26 February:

9:00 – 10:15 five cross-fertilization workshops (S1-S5)

10:45 – 12:00 five cross-fertilization workshops (S6-S10)

13:00 – 15:00 five parallel WG workshops

15:30 – 17:00 **plenary meeting**

19:00 dinner

Thursday 27 February:

- 9:00 – 18:00 technical tour

Workshop program 25 February 2020

12:00 – 13:00 lunch [room: Balkon PI, Educatorium]

13:00 – 14:30 plenary meeting [room: Boothzaal, University Library]

13:00 Welcome and seminar overview – Wilfried van Sark (UU)

13:10 Welcome and MC4 summary seminar overview – Angèle Reinders (UT)

13:20 Keynote lecture: CdTe technology and field experience - Karim Asali (First Solar)

14:10 Pearl PV databank – Wilfried van Sark (UU)

14:25 Organizational details – Wilfried van Sark (UU)

break

15:00 – 17:00 five parallel WG workshops (Ruppert building)

WG1: instruction on databank use (chair: Wilfried van Sark) [room: Ruppert 029]

15:00 Databank user manual – Wilfried van Sark, with video instructions from Carolin Ulbrich, Judit Süveges

15:30 Hands-on session on data uploads (bring your own data)

16:30 Feedback on experiences

WG2: Research progress and publications planning (chair: Mohammadreza Aghaei) [room: Ruppert 031]

15:00 Update and research progress – Mohammadreza Aghaei

15:20 Publication planning and preliminary framework – Jeff Kettle

15:40 New research planning based on the questionnaire results– Mohammadreza Aghaei/Jeff Kettle

16:00 Group discussion on contains, framework, timeframe for the publications – Mohammadreza Aghaei/Jeff Kettle

WG3: Research progress (chair: Nicola Pearsall) [room: Ruppert 115]

15:00 Update on working group progress – Nicola Pearsall

15:20 Contributions from group on current research activities - all

16:00 Discussion on contents and timeframes for joint publications – Nicola Pearsall / Joao Serra

16:20 Approach and programme for bifacial modelling development – Jesus Robledo Bueno

16:40 Discussion on future activities – Nicola Pearsall

WG4: PV on the landmark objects (chair: Mirjana Devetakovic) [room: Ruppert 139]

15.00 Workshop Introduction

15.10 Introduction of new vice-leader and new members

15.20 Presentations by participants (Cases of PV equipped landmark objects)

WG5: PV performance and power quality (chair: Jonathan Leloux) [room: Ruppert D]

15:00 Soiling losses affecting PV performance, Eduardo Fernandez (University of Jaén)

15:30 Power quality issues: a review, Sonia Pinto (University of Lisbon)

16:30 Fault detection applied to PV system fleets, Jonathan Leloux (Polytechnic University of Madrid)

Workshop program 26 February 2020

9:00 – 10:15 five cross-fertilization workshops (S1-S5) (Ruppert building)

10:45 – 12:00 five cross-fertilization workshops (S6-S10) (Ruppert building)

Lunch (Educatorium)

13:00 – 15:00 five parallel WG workshops (Ruppert building)

15:30 – 17:00 plenary meeting (Library)

Room Ruppert C	Room Ruppert 115	Room Ruppert 138	Room Ruppert 139	Room Ruppert 005
S1 Big Data Analytics Chair: Mohammadreza Aghaei	S2 PV systems integration Chair: tbc	S3 Simulation of complex shading for BIPV Chair: Jesus Robledo Bueno	S4 Modelling and monitoring of bifacial system gain Chair: Jonathan Leloux	S5 Assessment of spectral irradiance differences Chair: Atse Louwen
BREAK				
S6 Big Data Analytics (cont.) Chair: Mohammadreza Aghaei	S7 Assessment of performance of PV systems across Europe Chair: Jonathan Leloux	S8 Simulation of performance for curved surfaces Chair: Joao Serra	S9 Increasing industry collaboration with the Action Chair: Laura Azpilicueta	S10 Sustainability of PV in the built environment Chair: Mirjana Devetakovic

Session descriptions

S1, S6: PV Big Data Analytics (PVBDA): Applications, Techniques and Challenges (Chair: Mohammadreza Aghaei) [Room: Ruppert C]

The installation of utility-scale PV plants is increasing dramatically and a huge amount of data are generated through PV systems in various sampling rate.
PV Big Data Analytics (PVBDA) is very challenging, complex and highly multi-dimensional due to PV data are very stochastic because of the fluctuation of weather conditions especially temperature and irradiance and also various types of PV systems in terms of designing, configuration and capacity.
PVBDA aims to increase the reliability and service life of PV systems through developing the methods for automating the monitoring procedure, failures detection and analyzing the degradation mechanism systematically, predict the performance and real-time decision-making for remedial action during PV systems' operation.

S2: PV systems integration (Chair: tbc) [Room: Ruppert 115]

With over 100 GWp installed PV capacity in Europe integration in the electricity is an issue that needs detailed addressing. This session allows discussion of grid integration on different levels, from medium-voltage to microgrids.

S3: Simulation of complex shading for BIPV applications (Chair: Jesus Robledo Bueno) [Room: Ruppert 138]

Within the built environment, PV arrays can be subjected to shading from multiple sources. This session will present simulation of complex shading situations using Graphics Processing Unit (GPU) approach that allows high spatio-temporal resolution. This will build on some collaborative work already discussed in a preliminary manner and allow discussion of ways to take this forward.

S4: Modelling and monitoring of bifacial system gain (Chair: Jonathan Leloux) [Room: Ruppert 139]

Bifacial photovoltaic (PV) modules are now emerging as one of the most promising solutions to further reduce the costs of the electricity produced by PV systems, and more and more large-scale PV projects being planned with bifacial PV modules. Nevertheless, bifacial PV technology still faces challenges when it comes to project financing due to the perceived risks associated with it. One major challenge lies in the quantification of the bifacial energy gains (BEG) for bifacial PV modules and installations compared to conventional (monofacial) technologies. This challenge is reflected by the scarcity of reliable field data, and by the lack of accurate simulation and design tools for bifacial PV power plants on the market. In this context, Pearl PV is launching research activities targeting a better understanding, modeling and monitoring of BEG and its key influencing parameters.

S5: Assessment and mapping of the spectral irradiance differences in Europe (Chair: Atse Louwen) [Room: Ruppert 005]

As thin film technologies are more prone to the effects of varying solar spectra, collection and analysis of that data is necessary. This requires setting up data acquisition across Europe and analysis. One potential powerful indicator explaining spectral variation is the average photon energy, and mapping of APE would be worthwhile to identify spectral variations across Europe.

S6: PV Big Data Analytics (PVBDA): Applications, Techniques and Challenges (Chair: Mohammadreza Aghaei) [Room: Ruppert C]

Continuation of session S1, see above.

S7: Assessment and mapping of the performance of PV systems in Europe (Chair: Jonathan Leloux) [Room: Ruppert 115]

Actual performance data analysis is necessary to increase confidence in reliable power generation. Data made available in the data bank should allow for a Europe wide assessment of actual performance, which can be compared to optimum maps from PVGIS. In fact, this would constitute the core of the results from analysing performance data in the databank

S8: Simulation of performance for curved surfaces (Chair: Joao Serra) [Room: Ruppert 138]

For some applications, e.g. vehicle integration, buildings, the PV surface may be curved. This workshop would consider the issues in simulating these surfaces, including possible approaches and boundary conditions.

S9: Increasing industry collaboration with the Action (Chair: Laura Azpilicueta) [Room: Ruppert 139]

During this workshop, we are going to analyse all the steps we have been doing and also the necessary ones to approach the project to the industry and the result. It is very important to understand the needs of the industry and how our project can help them.

Based on the experiences in the last months, we are also going to present the action plan for the next months with some collaborations to disseminate the message of the project in conferences, events, newsletters, and so on.

S10: Sustainability of PV in the built environment (Chair: Mirjana Devetakovic) [Room: Ruppert 005]

The utilization of solar energy conversion systems is at the forefront of attention as they are considered carbon dioxide neutral and can be used in order to cover both electricity and heating load demands. Thus, these systems need to be thoroughly investigated taking into consideration the variations in the solar potential and the differences that exist in the electricity mix throughout Europe both in terms of cost, as well as of emissions, in order to assess their sustainability.

Detailed session programs

S1: PV Big Data Analytics (PVBDA): Applications, Techniques and Challenges (Chair: Mohammadreza Aghaei) [Room: Ruppert C]

9:00 – 9:20	Jeff Kettle (Bangor University), Forecasting OPV outdoor degradation rates and diurnal performances via machine learning
9:20 – 9:40	Mirjam Theelen (TNO) Prediction of the lifetime of CIGS thin-film photovoltaics
9:40 – 10:00	Pelin Yilmaz (University of Twente, TNO), Defect investigation by 'coring'
10:00 – 10:15	Roundup

S2: PV systems integration (Chair: tbc) [Room: Ruppert 115]

9:00 – 9:20	Jovan Todorović (Elektroprijenos BiH), Integration of PV production into MW distribution grid
9:20 – 9:50	Penka Georgieva (Burgas Free University), Fuzzy Models for Managing and ANN for forecasting an Integrated Micro PV System
9:50 – 10:05	Michiel Roelofs (Taylor Solar), Cell-string level optimization for increased system reliability.
10:05 – 10:15	Roundup

S3: Simulation of complex shading for BIPV applications (Chair: Jesus Robledo Bueno) [Room: Ruppert 138]

9:00 – 9:30	Jesus Robledo Bueno (LuciSun), Shading impact analysis in PV installations using GPU hardware - One small step for the video game industry, one giant leap for the PV simulation community
9:30 – 10:00	Gabriele Lobaccaro (NTNU) Solar accessibility, solar reflections and overshadowing effect in urban environments: Opportunities, Challenges and Barriers in Nordic climate
10:00 – 10:15	Roundup

S4: Modelling and monitoring of bifacial system gain (Chair: Jonathan Leloux) [Room: Ruppert 139]

9:00 – 9:20	Jonathan Leloux (UPM), Bifacial energy gain: review of state of the art and future challenges
9:20 – 9:40	Several members from WG5, Modelling of bifacial energy gain using GPU-based techniques
9:40 – 10:00	Several members from WG5, Monitoring of bifacial energy gain in the lab and in the field
10:00 – 10:15	Roundup

S5: Assessment and mapping of the spectral irradiance differences in Europe (Chair: Atse Louwen) [Room: Ruppert 005]

9:00 – 9:20	Wilfried van Sark (UU), Rationale of mapping spectral irradiance
9:20 – 9:40	Atse Louwen (EURAC), Evaluation of different indicators for representing solar spectral variation
9:40 – 10:00	Anne Gerd Imenes (University of Agder), Spectral irradiance distribution for PV applications at high latitude
10:00 – 10:15	Roundup

Break

S6: PV Big Data Analytics (PVBDA): Applications, Techniques and Challenges (Chair: Mohammadreza Aghaei) [Room: Ruppert C]

10:45 – 11:05	Mohammadreza Aghaei (TU/e), Autonomous monitoring and analysis of PV systems
11:05 – 11:25	Jesper Jacobsson (Helmholtz-Zentrum Berlin), The Power of the Crowd. What Could be Learned by Collective Pooling of all the World's Perovskite Device Data, and How do We Get There?
11:25 – 11:45	Naylani Halpern-Wight (Uni Twente), Nowcasting of PV performance with ML / neural networks using big PV data as an input.
11:45 – 12:00	Roundup

S7: Assessment and mapping of the performance of PV systems in Europe (Chair: Jonathan Leloux) [Room: Ruppert 115]

10:45 – 11:05 Jonathan Leloux (UPM), Analysis of the performance of PV systems in Europe

11:05 – 11:25 Kun Kunaifi (Uni Twente), Analytical Assessment of the Performance of Fifteen PV systems of Six Technologies in Three Climates

11:25 – 11:45 Alexandros Charalambides (Cyprus University of Technology), Photovoltaic Power Forecasting with no Exogenous Inputs

11:45 – 12:00 Roundup

S8: Simulation of performance for curved surfaces (Chair: Joao Serra) [Room: Ruppert 138]

10:45 – 11:05 João Manuel de Almeida Serra (Universidade de Lisboa), Get the PV simulations into shape!

11:05 – 11:45 Group discussion of parameter definition, trade-offs and economic issues relating to three major applications related to curved surfaces – BIPV, landscapes and vehicles

11:45 – 12:00 Roundup

S9: Increasing industry collaboration with the Action (Chair: Laura Azpilicueta) [Room: Ruppert 139]

10:45 – 11:15 Laura Azpilicueta (Solar United)

11:15 – 11:45 Daniel Oechslin (GE Venture)

11:45 – 12:00 Roundup

S10: Sustainability of PV in the built environment (Chair: Mirjana Devetakovic) [Room: Ruppert 005]

10:45 – 11:05 Georgios Martinopoulos (International Hellenic University), Are rooftop photovoltaic systems a sustainable solution for Europe? A life cycle impact assessment and cost analysis

11:05 – 11:25 Cihan Gercek (University of Twente), Model-Based Design with BIMsolar: Project results of BIPV lecture in terms of Energy Balance, Aesthetics, Regulatory, and Financial aspects

11:25 – 11:45 Tom Minderhoud (UN Studio), Imagine a future, where buildings become energy sources

11:45 – 12:00 Roundup

12:00 – 13:00 lunch [ROOM: Balkon PI, Educatorium]

13:00 – 15:00 5 parallel WG workshops

WG1: Report back from cross-fertilization workshops (chair: Wilfried van Sark)
[Room: Ruppert C]

13:00 – 13:15 Report from session 1 and 6

13:15 – 13:30 Report from session 2 and 7

13:30 – 13:45 Report from session 3 and 8

13:45 – 14:00 Report from session 4 and 9

14:00 – 14:15 Report from session 5 and 10

14:15 – 15:00 General discussion on take-aways for WG1

WG2: Report back from cross-fertilization workshops (chair: Mohammadreza Aghaei)
[Room: Ruppert 115]13:00 – 13:15 Report from session 1 and 6

13:15 – 13:30 Report from session 2 and 7

13:30 – 13:45 Report from session 3 and 8

13:45 – 14:00 Report from session 4 and 9

14:00 – 14:15 Report from session 5 and 10

14:15 – 15:00 General discussion on take-aways for WG2

WG3: Report back from cross-fertilization workshops (chair: Nicola Pearsall)
[Room: Ruppert 138]

13:00 – 13:15 Report from session 1 and 6

13:15 – 13:30 Report from session 2 and 7

13:30 – 13:45 Report from session 3 and 8

13:45 – 14:00 Report from session 4 and 9

14:00 – 14:15 Report from session 5 and 10

14:15 – 15:00 General discussion on take-aways for WG3

WG4: Report back from cross-fertilization workshops (chair: Mirjana Devetakovic)
[Room: Ruppert 139]

13:00 – 13:30 Reports from cross-fertilization sessions

13.30 – 14.00 Plan of the WG4 activities for next year

14.00 – 15.00 Activity in subgroups - state of the papers in progress,
new papers proposals

WG5: Report back from cross-fertilization workshops (chair: Jonathan Leloux)
[Room: Ruppert 005]

13:00 – 13:15 Report from session 1 and 6

13:15 – 13:30 Report from session 2 and 7

13:30 – 13:45 Report from session 3 and 8

13:45 – 14:00 Report from session 4 and 9

14:00 – 14:15 Report from session 5 and 10

14:15 – 15:00 General discussion on take-aways for WG5

Break

15:30 – 17:00 plenary meeting (chair David Moser) [room: Boothzaal, University Library]

15:30 Opening – Angele Reinders (UT)

15:35 Reports from WG leaders on sessions and workshops, 10 minutes each

16:25 Safety, Compliance, and Reliability of Integrated PV – Bonna Newman (TNO)

16:45 Organizational details on dinner and excursion – Wilfried van Sark (UU)

16:55 Closing address – Angele Reinders (UT)

19:00 dinner [Senaatszaal, Academiegebouw, Domplein]

Excursion 27 February 2020

9:00 assembly at **Utrecht Science Park**
in front of library

9:15 leave for **Galecop PV park**

9:30 presentation and short viewing

10:30 leave for Amsterdam ARENA

11:00/15 arrive at **Amsterdam ARENA**

11:15 presentations

12:15 lunch

13:00 excursion

14:00 leave for **Heerhugowaard City of the Sun**

15:00 presentation and excursion

16:30 leave for Schiphol

17:30 arrival at Schiphol

18:15/30 arrival at Utrecht
Central Station