

COST Action PEARL PV CA16235

Performance and Reliability of Photovoltaic Systems:  
Evaluations of Large-Scale Monitoring Data



## Training School IV

### Potential of monitoring tools, advanced operation and maintenance practice for security and predictability of PV performance

08 – 11 March 2022

Host: University of Twente, Enschede, The Netherlands

Final Programme

This will be a hybrid physical/on-line event due to the circumstances related to the control of Covid-19. On-line participation will be available for those who are unable to travel. Timings are based on Central European Time.

## Schedule of events

### Tuesday 08 March 2022 – Day 1 – Room T1300, Horst Building

| Time        | Activity  | Lecturer  |
|-------------|---|---|
| 09:30-10:00 | Registration and Opening of the Training School   | Angèle Reinders / University of Twente<br>Wilfried Van Sark/ Utrecht University, Copernicus Institute<br>Jeffrey Kettle / University of Glasgow |
| 10:00-11:30 | Participants introduction – training school participants introduce themselves and their research activities / team building | Chair: Aleksandra Krstic-Furundzic / Univ.Belgrade  |
| 11:30-12:00 | <i>Coffee break</i>   |   |
| 12:00-13:00 | Product development for PV performance control  | Angèle Reinders / University of Twente  |
| 13:00-14:00 | <i>Lunch break</i>  |   |
| 14:00-15:00 | Data monitoring & analytics for better PV performance and grid integration  | Jonathan Leloux / Polytechnic University of Madrid, Spain   |
| 15:00-15:45 | Fabrication of AI-BSF cells; assembly of crystalline-silicon-based modules  | Jurriaan Schmitz / University of Twente   |
| 15:45-16:15 | <i>Coffee break</i>   |   |
| 16:15-17:00 | PV reliability review   | Jurriaan Schmitz / University of Twente   |

### Wednesday 09 March 2022 – Day 2 – Room T1300 Horst Building

| Time        | Activity  | Lecturer  |
|-------------|---|---|
| 09:30-10:30 | PV performance monitoring in a 100% renewable society                             | Wilfried Van Sark/ Utrecht University, Copernicus Institute                         |
| 10:30-11:30 | Understanding potential-induced degradation (PID) of photovoltaic (PV) modules    | Mahmoud Dhimish / University of York, UK  |
| 11:30-12:00 | <i>Coffee break</i>   |   |
| 12:00-13:00 | PV Module forensics and characterization of material degradation in the field     | Gernot Orenski / Polymer Competence Center Leoben GmbH (PCCL)                       |
| 13:00-14:00 | <i>Lunch break</i>  |   |
| 14:00-14:45 | Excursion at University of Twente Campus – visit to PV plants and energy projects | Ray Klumpert / University of Twente, start at Linde Building                        |
| 14:45-15:45 |   |   |
| 15:45-16:15 | <i>Coffee break</i>   |   |
| 16:15-17:00 | Workshop - explanation of the task<br>Facilitated discussion                      | Aleksandra Krstic-Furundzic / Univ. Belgrade,<br>Cedric Caruana, Univ. Malta<br>--- |

### Thursday 10 March 2022 – Day 3 - Room T1300, Horst Building

| Time        | Activity  | Lecturer                                 |
|-------------|---|--|
| 09:30-10:30 | PV fault detection and classification using AI-based technologies                             | Mahmoud Dhimish / University of York, UK |
| 10:30-11:30 | Photovoltaic and Solar Forecasting  | Eli Shirazi / University of Twente       |
| 11:30-12:00 | <i>Coffee break</i>   |  |
| 12:00-13:00 | The role of digitalization in advanced operation and maintenance practices                    | Atse Louwen / EURAC Research             |
| 13:00-14:00 | <i>Lunch break</i>  |  |
| 14:00-14:15 | Workshop - Group exercise   | ---                                      |
| 14:15-15:30 | Workshop - Group exercise   | ---                                      |
| 15:30-16:00 | <i>Coffee break</i>   |  |
| 16:00-17:00 | Workshop - Group exercise<br>Preparation of group presentations for wrap-up session on Friday | ---                                      |

## Friday 11 March 2022 – Day 4 Room W3, Waaier Building

| Time        | Activity  | Lecturer   |
|-------------|---|--|
| 09:30–10:15 | Preparation of group presentations for wrap-up session                            | Aleksandra Krstic-Furundzic/<br>Univ. Belgrade,  |
| 10:15–11:00 | Preparation of group presentations for wrap-up session                            | Cedric Caruana, Univ. Malta<br>---   |
| 11:00–11:30 | Coffee break  |  |
| 11:30–12:45 | Interactive poster session and reports on task                                    | Aleksandra Krstic-Furundzic/<br>Univ. Belgrade,<br>Cedric Caruana, Univ. Malta<br>Angèle Reinders / Univ. Twente,<br>Wilfried Van Sark/ Univ. Utrecht,<br>Jeffrey Kettle / Univ. Glasgow |
| 12:45–13:30 | Wrap-up and closure of the training school/ joined lunch for on-site participants | Angèle Reinders / Univ. Twente,<br>Wilfried Van Sark/ Univ. Utrecht,<br>Jeffrey Kettle / Univ. Glasgow<br>Aleksandra Krstic-Furundzic/<br>Univ. Belgrade,<br>Cedric Caruana, Univ. Malta |

### Address of the venue:

University of Twente, Enschede, The Netherlands

### Contact persons:

Training School Manager: Prof. Dr. Aleksandra Krstic-Furundzic, University of Belgrade, at [akrstic@arh.bg.ac.rs](mailto:akrstic@arh.bg.ac.rs) or [akrsticfurundzic@gmail.com](mailto:akrsticfurundzic@gmail.com)

Training School Manager: Dr. Cedric Caruana, University of Malta, at [cedric.caruana@um.edu.mt](mailto:cedric.caruana@um.edu.mt)

### Local organizers:

Prof. Dr. Angèle Reinders / University of Twente, at [a.h.m.e.reinders@utwente.nl](mailto:a.h.m.e.reinders@utwente.nl)

Prof. Dr. Wilfried Van Sark/ University of Utrecht, Copernicus Institute, at [w.g.j.h.m.vansark@uu.nl](mailto:w.g.j.h.m.vansark@uu.nl)

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### This Training School is supported by

