# PVSSS 2023

TU Delft
Delft University of Technology

**PV Systems Summer School at TU Delft**

This Summer school aims to give hands-on experience on different fundamental, technical, and practical aspects of PV systems. The 6th International PV Systems Summer School (PVSSS 2023) is planned from the 2nd to the 7th of July 2023 (from Sunday afternoon to Friday evening). The website is www.tudelft.nl/pvsss.

Targeted participants are PhD candidates, PostDocs, R&D people, and engineers.

The summer school will feature:

- On Sunday, 2nd of July, a get-together dinner 18:00
- On Monday, 3rd of July, at 8:30, a stimulating opening session given by prof. dr. Olindo Isabella (Head Photovoltaic Materials and Devices group at TU Delft)
- From Monday, 3rd of July, to Friday, 7th of July
  - Fourteen 45-min long lectures (> 10 hours of theory), given by experts in solar energy from TU Delft and other international universities and R&D centers
  - Eight 2.5-hour long practical sessions to accommodate up to 24 attendees in our PV Laboratory as well as access to our Virtual PV Laboratory (3-D virtual environment)
- On Wednesday, 5th of July, an industrial tour followed by an inspiring plenary talk, given by Prof. dr. Eicke Weber (Chair of the European Solar Manufacturing Council ESMC), and a banquet
- On Thursday, 6th of July, a visit to the Green Village (https://www.thegreenvillage.org/)
- On Friday, 7th of July, a closing session followed by dinner.

The fee per person includes:

- > 10 hours of lectures by international experts (15 x 45 min):

  **L1.** Prof. dr. M. Zeman (TU Delft, NL): *Future solar-powered electrical energy systems*
  **L2.** Dr. R. Santbergen (TU Delft, NL): *PV multiscale modelling*
  **L3.** Prof. dr. I. Gordon (IMEC, BE / TU Delft, NL): *Status of c-Si PV technology - cells and modules*
  **L4.** Prof. dr. A. W. Weeber (TU Delft, NL): *Status of thin-film PV technology and multi-junctions*
  **L5.** Dr. E. Voroshazi / Dr. N. Gazbour (CEA-INES, FR): *Sustainability and circularity in PV*
  **L6.** Prof. dr. M. Topič (Uni Ljubljana, SL): *PV modules monitoring and energy yield forecast*
  **L7.** Dr. R. Kopeček (ISC K, DE): *The evolution of bifacial revolution*
  **L8.** Dr. A. Scognamiglio (ENEA, IT): *PV integration in Urban and Open Landscape*
  **L9.** Dr. P. Manganiello (TU Delft, NL): *Photovoltatronics*
  **L10.** Dr. M. Vogt (TU Delft, NL): *Materials usage in c-Si PV and design for recycling* (tentative)
  **L11.** Prof. dr. P. Palensky (TU Delft, NL): *Impact of renewable energy systems on digitized society*
  **L12.** Prof. dr. P. Bauer (TU Delft, NL): *Power electronics, microgrids, and e-mobility*
  **L13.** Prof. dr. C. van Kruijsdijk (Shell, NL / TU Delft, NL): *Green hydrogen*
  **L14.** Dr. H. Ziar (TU Delft, NL): *X-IPV systems*

- 15 hours of hands-on workshop in our state-of-the-art PV Laboratory (6 x 2.5 hours):

  **PV1.** Discover and measure properties of light
  **PV2.** Build your EQE setup and measure spectral response of real devices
  **PV3.** Characterize commercially-available PV modules (JV and EL)
  **PV4.** Understand the charging cycle of batteries and justify the use of charge controller
  **PV5.** Simulate a complete PV system from power electronics perspective
  **PV6.** Mount a real 2 $kW_p$ grid-connected DC-coupled PV system with AC backup

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## Detailed programme

| From | To | Sunday 02-Jul | Monday 03-Jul | Tuesday 04-Jul | Wednesday 05-Jul | Thursday 06-Jul | Friday 07-Jul |
|---|---|---|---|---|---|---|---|
| 08:30 | 08:45 | | Intro/Opening Snijderzaal | | | | |
| 08:45 | 09:00 | | | L3 Snijderzaal | L6 Snijderzaal | L9 Snijderzaal | L12 Snijderzaal |
| 09:00 | 09:15 | | Teams making | | | | |
| 09:15 | 09:30 | | Coffee break | Coffee break | Coffee break | Coffee break | Coffee break |
| 09:30 | 09:45 | | | | | | |
| 09:45 | 10:00 | | | | L7 Snijderzaal | | |
| 10:00 | 10:15 | | | | | | |
| 10:15 | 10:30 | | | | Coffee break | | |
| 10:30 | 10:45 | | Laboratory | Laboratory | | Laboratory | Laboratory |
| 10:45 | 11:00 | | | | L8 Snijderzaal | | |
| 11:00 | 11:15 | | PV LAB | PV LAB | | PV LAB | PV LAB |
| 11:15 | 11:30 | | | | Announcements | | |
| 11:30 | 11:45 | | | | Free time | | |
| 11:45 | 12:00 | | | | | | |
| 12:00 | 12:15 | | | | | Lunch and visit the Green Village | |
| 12:15 | 12:30 | | Lunch Snijderzaal | Lunch Snijderzaal | Lunch Snijderzaal | | Lunch Snijderzaal |
| 12:30 | 12:45 | | | | | | |
| 12:45 | 13:00 | | | | | | |
| 13:00 | 13:15 | | Free time | Free time | Meeting at Stieltjesweg 1 | | Free time |
| 13:15 | 13:30 | | | | | Coffee break | |
| 13:30 | 13:45 | | | | | | |
| 13:45 | 14:00 | | L1 Snijderzaal | L4 Snijderzaal | | L10 Snijderzaal | L13 Snijderzaal |
| 14:00 | 14:15 | | | | | | |
| 14:15 | 14:30 | | Coffee break | Coffee break | | Coffee break | Coffee break |
| 14:30 | 14:45 | | | | | | |
| 14:45 | 15:00 | | | | Industrial tour: | L11 Snijderzaal | |
| 15:00 | 15:15 | | | | | | |
| 15:15 | 15:30 | | | | | Coffee break | |
| 15:30 | 15:45 | Check-in | Laboratory | Laboratory | | | Laboratory |
| 15:45 | 16:00 | | | | 1. Exasun | | |
| 16:00 | 16:15 | Delft | PV LAB | PV LAB | 2. EternalSun | | PV LAB |
| 16:15 | 16:30 | | | | | | |
| 16:30 | 16:45 | | | | | Laboratory | |
| 16:45 | 17:00 | | | | | | |
| 17:00 | 17:15 | | Coffee break | Coffee break | | PV LAB | Coffee break |
| 17:15 | 17:30 | | | | | | |
| 17:30 | 17:45 | | L2 Snijderzaal | L5 Snijderzaal | | | L14 Snijderzaal |
| 17:45 | 18:00 | | | | | | |
| 18:00 | 18:15 | | | | | | Closing Snijderzaal |
| 18:15 | 18:30 | Welcome Dinner | | | | | |
| 18:30 | 18:45 | | | | Plenary session + dinner in Scheveningen | | Free time |
| 18:45 | 19:00 | | | | | | |
| 19:00 | 19:30 | | Free time | Free time | | Free time | |
| 19:30 | 20:00 | | | | | | Closing dinner in Delft |
| 20:00 | 20:30 | | | | | | |
| 20:30 | 21:00 | | | | | | |
| 21:00 | 21:30 | Free time | | | | | |
| 21:30 | 22:00 | | | | | | |
| 22:00 | 22:30 | | | | | | |
| 22:30 | 23:00 | | | | | | |

Check-in

Announcements
Lectures
Laboratory

Social events
Industrial tour

Coffee break
Lunch
Free time

| | |
|---|---|
| Intro/Closing | Isabella |
| **Opening** | **van Vliet (dean)** |
| L1 | Zeman |
| L2 | Santbergen |
| L3 | Gordon |
| L4 | Weeber |
| L5 | Voroshazi/Gazbour |
| L6 | Topič |
| L7 | Kopecek |
| L8 | Scognamiglio |
| **Plenary** | **Eicke Weber** |
| L9 | Manganiello |
| L10 | Vogt |
| L11 | Palensky |
| L12 | Bauer |
| L13 | van Kruijsdijk |
| L14 | Ziar |