

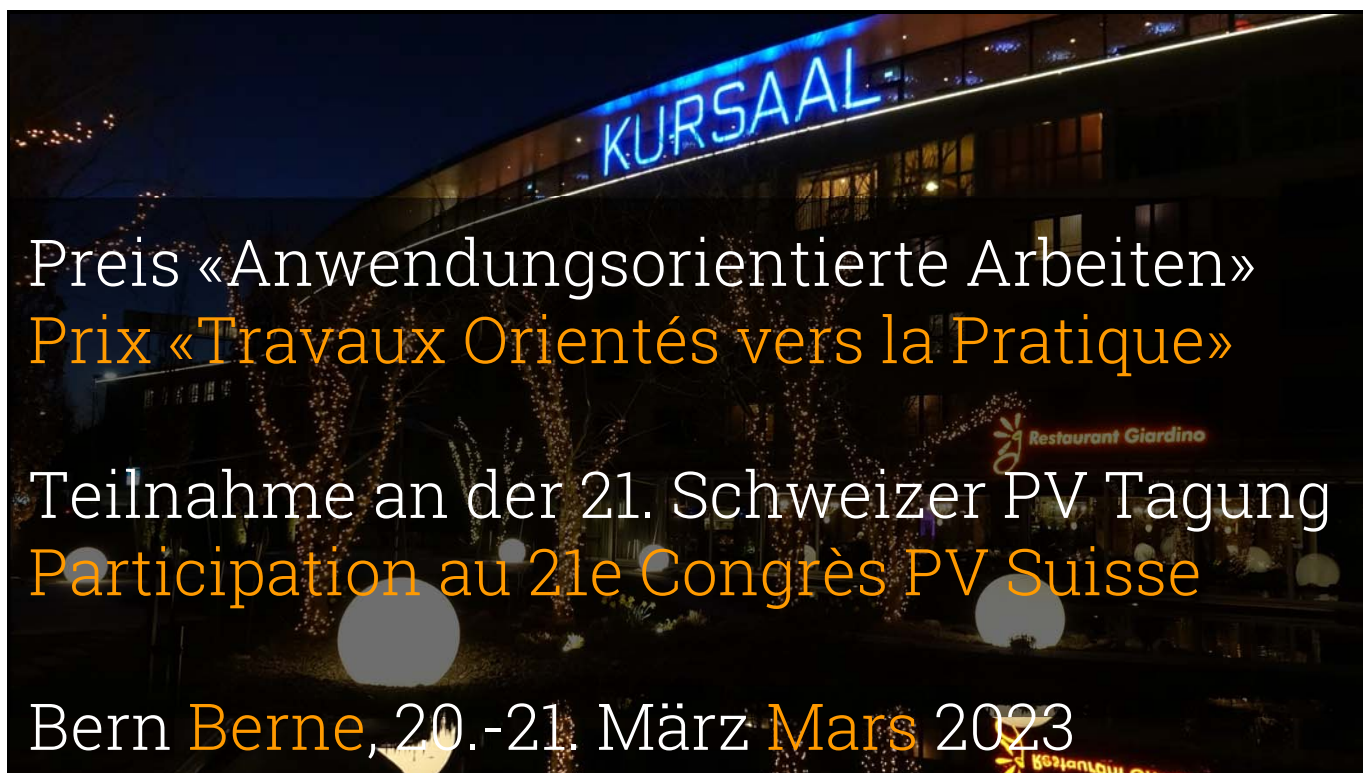
# Posterprämierung Posters: remise des prix

Stefan Nowak, NET Nowak Energie & Technologie AG SA

20. Nationale Photovoltaik-Tagung  
20<sup>e</sup> Congrès photovoltaïque national

## Statistik Statistique

	2022	2021	2020	2019	2018	2017	2016	2015	2014
Kategorien	27	25	29	36	25	29	28	27	42
A Solarzellen	6	7	5	4	4	5	9	5	13
B Module	2	1	3	4	0	3	1	3	6
C PV-Gebäudeintegration	4	2	1	5	1	5	2	3	4
D Wechselrichter und Speicherkonzepte	1	4	1	4	3	2	6	1	3
E Innovative Anwendungen		2	5	3	0	0	0	0	4
F Netz- und Systemintegration	2	2							
F alt Ausbildung			0	0	0	0	0	0	1
G Anlagen, Messungen, Erfahrungen	9	3	9	7	7	11	8	13	5
H Software- und Simulationstools	1		2	4	5	3	0	2	5
J Umweltaspekte und Recycling									
K Digitalisierung in der Energiewirtschaft	1	2							
L Markteinführung und Rahmenbedingungen	1	2	3	5	5	0	2	0	1



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Preis anwendungsorientiertes Poster  
Prix poster orienté sur la pratique

Unter Würdigung der Kriterien inhaltlich, wissenschaftlicher und Gestaltung hat die Jury folgendes Poster ausgewählt. Ein nominationscomité composé de membres du jury d'innovation et de concepteurs du jury a récompensé le poster ci-dessous.

**Titel:**  
What drives performance in data-driven and weather-based techniques for short-term PV forecasting?

**Autoren & Institut:** *nowak@inf.ethz.ch*  
R. Carrillo, P.-J. Alet, S. Müller, J. Remund  
CSIM SA, Neuchâtel

Bern, 29./30.3.2022

Stefan Nowak  
Leiter der Jury  
Director du jury

Stefan Oberholzer  
Leiter Forschungsbereich PV und CSP - BFE  
Chief Scientific Officer PV and CSP - BFE

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**What drives performance in data-driven and weather-based techniques for short-term PV Forecasting?**  
Rafael E. Carrillo, Pierre-Jean Alet, Stefan C. Müller and Jan Remund  
CSIM SA, Neuchâtel, Switzerland

**Abstract:**  
Short-term weather forecast offers to increasingly diverse for agriculture and PV production with high accuracy up to six hours ahead (1h-6h window).  
Classification is based on satellite images and numerical weather models to propagate the short-term forecasts in the field.  
Additionally, Classification uses online ground data to correct the forecasts.

**Keywords:** CSIM developed a data-driven forecast model for high-PV production forecasting based on Graph neural networks (GNNs). These methods can incorporate the combination of forecasts for a lead-6h (after solar noontime).  
**Objective:** compare GNNs' data-driven models with Classification to different scenarios to provide insight into their performance drivers.

**Graph-based multi-site PV forecasting**

**Evaluation setup**

**Results and Discussion**

**Final results:**

- MAPE is decreasing from 10% to 5% for the 1h-6h window.
- MAPE is decreasing from 10% to 5% for the 1h-6h window.
- MAPE is decreasing from 10% to 5% for the 1h-6h window.

**Conclusion:**  
Classification and GNNs show similar performance in terms of MAPE. However, GNNs are more robust to data scarcity and can be trained on a smaller dataset. Classification is a simpler model and can be trained on a larger dataset. GNNs are more robust to data scarcity and can be trained on a smaller dataset. Classification is a simpler model and can be trained on a larger dataset.

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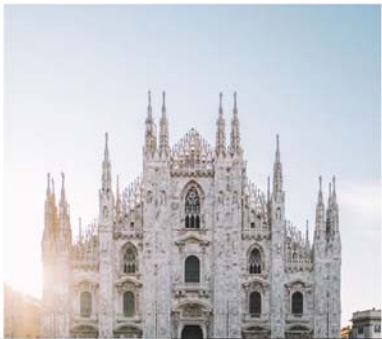
# Preis «Wissenschaftliche Entwicklungen» Prix «Développements Scientifiques»

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### 20. Nationale Photovoltaik-Tagung 20<sup>e</sup> Congrès photovoltaïque national

#### Preis wissenschaftlich-technisches Poster Prix poster scientifique-technique

Unter Würdigung des Kriteriums «Innovation» wird die Gestaltung hat die Jury folgendes Poster ausgezeichnet. Ein reconnaissance des critères «Innovation» et «Innovation», la jury a récompensé la poster ci-dessous.

**Title / Titre:**  
The Sirius project: From single cell laminate to full size demonstration IBC modules.

**Autoren & Institut / auteurs & institut:**  
D. L. Sittner, D. Lachner, L. Betszold, T. Kössler, W. Frankenhöfner, B. Lagradic, R. Grischke, G. Marti, J. Champfaud, L. Bosma, M. Despelser, B. Pavlet-Salomon, R. Kramer, L'Vout'Vic, N. Polin  
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Bern, 29./30.3.2022

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### Sirius project

From single cell laminate to full size demonstration IBC modules

**MEYER BURGER**  
= **CSEM**

D. L. Sittner, L. Sittner, D. Lachner, W. Frankenhöfner, B. Kramer, B. Lagradic, L. Betszold, T. Kössler, M. Papp, A. Speckert, G. Marti, M. Bosma, L. Bosma, J. Champfaud, L. Bosma, M. Despelser, B. Pavlet-Salomon, R. Kramer, L'Vout'Vic, N. Polin  
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**The Sirius project**  
In a research collaboration with CSEM and supported by industrial Meyer Burger Research (MBR) and Meyer Burger Technology (MBT) advanced a single silicon heterojunction (SHJ) cell technology. The Sirius project supported by the EPFL provides the IBC technology to larger substrate IBC modules in a semi-automated and cell and module production combined with outdoor monitoring. The project targets to demonstrate the technology readiness of the first cell and module technology and serve as the basis of subsequent commercial production.

**Rapid module power evolution (M2)**  
Module power evolution (M2) over time (2019-2021) showing a significant increase in power output.

**Mass production ready process**  
Due to the development of a laser assisted SHJ technology (SHJ-IBC) and the use of a single module process (M2), the mass production ready process (M2) is achieved. The process is based on a laser assisted SHJ-IBC technology (SHJ-IBC) and the use of a single module process (M2).

**Cell laminate, proof of concept for IBC modules**  
Detailed structure of MBR's IBC-120 cell.

**Outdoor installation & monitoring**  
Development of outdoor installation and monitoring system for IBC modules.

**350W IBC module 120 half-cells M2**  
Detailed structure of MBR's IBC-120 cell.

**High efficiency 23.2% record cell & 24.7% (recorded) module**  
High efficiency 23.2% record cell & 24.7% (recorded) module achieved by MBR IBC modules. Best module performance (efficiency) 24.7% in 120 half-cell module tested by Fraunhofer ISE.

Prototype modules received outdoor and yield monitoring started. Process continues to larger M2 substrate covered with high performance IBC cells production.

The project is supported by the joint and demonstration programme of the Swiss Federal Office of Energy (FOEN).

www.sirius77

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### Performance comparison of a P370 power optimizer system and a string inverter system

Cyril Allemann, Arturo Ramirez, Andre Schneider, Franz Baumgartner, Fabian Cargoni

**Research objectives**

- Verify performance comparison of a residential on-roof-mounted P370 power optimizer system and a conventional string inverter (P370) system under real-world and partially shaded conditions in terms of efficiency.
- Analysis of voltage conversion performance for a 3-phase P370 power optimizer.

**Methodology**

- Voltage measurements measurements were used to create a system model. The system model was fed into a Matlab/Simulink model and the resulting power conversion efficiency was compared with the system model results for the real-world system.
- Simulation results are presented in the form of a P370 gain. P370 gain represents the ratio of the energy conversion efficiency of the optimizer system when compared to the P370. The P370 gain efficiency (P370 gain) is defined as the ratio of the P370 gain and the P370 gain efficiency of the P370 system. The P370 gain efficiency is defined as the ratio of the P370 gain and the P370 gain efficiency of the P370 system.

$$P_{370\text{ gain}} (\%) = \frac{P_{370\text{ gain}}}{P_{370\text{ gain efficiency}}}$$

**Table 1: Simulation cases of simulated system configurations**

Case	PV	P370	String inverter system	MPPT system
1 Phase	100 W	100 W	100 W	100 W
2 Phase	100 W	100 W	100 W	100 W
3 Phase	100 W	100 W	100 W	100 W

**Figure 1: Simulated shading situation**

**Figure 2: Heatmap of P370 gain (%)**

**Figure 3: Line graph of P370 gain efficiency (%)**

**Table 2: P370 gain (%) (Simulated P370 gain efficiency) for a 3-phase system partially shaded conditions**

Shading	System	1-phase system	2-phase system	3-phase system
100%	100 W	100.0%	100.0%	100.0%
	100 W	100.0%	100.0%	100.0%
50%	100 W	100.0%	100.0%	100.0%
	100 W	100.0%	100.0%	100.0%
25%	100 W	100.0%	100.0%	100.0%
	100 W	100.0%	100.0%	100.0%

**Results**

- During voltage conversion, the P370 gain efficiency is higher than the string inverter system and it is more efficient than the string inverter system. The P370 gain efficiency is higher than the string inverter system and it is more efficient than the string inverter system.
- The P370 gain efficiency is higher than the string inverter system and it is more efficient than the string inverter system.

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Herzlichen Glückwunsch !  
Félicitations cordiales !

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