

1st SPECIAL PV Workshop

Space Photovoltaics for Energy Conversion in extra-terrestrial environment



Organized by



With the support of



23 & 24 November 2021
2 half days – Online

Free of charge

Register at <https://www.ines-solaire.org/en>

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SCOPE

Since Vanguard 1 satellite, the first spacecraft to use solar panels back in 1958, space photovoltaics (PV) have been strongly improved from the initial single junction low efficiency silicon solar cells to the high efficiency III-V compound multi-junction solar cells. For such specific space applications, the driving force is still the long-term reliability, particularly considering radiation resistance, while improving the conversion efficiency and increasing the power-to-mass ratio. However, space conquest is currently intensified with new applications to become reality, such as satellite constellations, and overall costs have to be minimized in the course of space PV standardization.

The 1st edition of the SPECIAL PV Workshop will focus on PV cells and arrays designed for space applications with the latest research and industrial results presented by highly skilled experts of the field. Four sessions and one round table will take place virtually during two half-days, addressing the latest research topics of Space PV cell & arrays manufacturing, as well as their reliability and durability through indoor accelerated ageing tests and thermo-mechanical simulations.

*This workshop provides an informal, unclassified, international forum for the exchange of ideas and information on space photovoltaic cells and arrays. Addressed to researchers, industrials, academics and students. **Free of charge.***

Due to the COVID situation uncertainty, this 1st edition will be an online-only event.

This event is financed and promoted through the [ECoVEM European project](#) which aims at establishing a transnational cooperation platform of Centres of Vocational Excellence in Microelectronics working on the synergies between both the education and industrial sectors by fostering the development of technological and entrepreneurial skills for the new jobs in microelectronics, including photovoltaics. This project has received funding from the European Union's ERASMUS+ programme (Grant Agreement n° 620101-EPP-1-2020-1-BG-EPPKA3-VET-COVE).

The [RadHard European project](#) co-coordinates the SPECIAL PV Workshop. The RadHard consortium aims to combine the most radiation hard III-V materials to form a highly efficient four-junction space solar cell via direct wafer bonding. RadHard receives funding from the European Union's Horizon 2020 Research and Innovation Programme (Grant Agreement n°EU/821876).

SPECIAL PV WORKSHOP PROGRAM

DAY 1: Solar cells

Introduction | SPECIAL PV Workshop

10' talks

Chairman: Jean-François Lelièvre (INES)

14h00 (CET)	David Lackner (Fraunhofer ISE)	<i>Introduction & RadHard European project</i>
14h15	Slavka Tzanova (TUS)	<i>ECOVEM Business-Science-Education Plan</i>
14h25	Romain Cariou (CEA-INES)	<i>Brief overview of Space PV research</i>

Session 1 | High efficiency III-V solar cells

15' talks + 5' Q&A

Chairman: Romain Cariou (CEA-INES)

14h40	Victor Khorenko (Azur Space)	<i>State-of-the-art in European industrial solar space cells: highest performance for advanced space applications</i>
15h00	Iván Garcia (IES-UPM)	<i>Space solar cells on detachable Ge virtual substrates</i>
15h20	David Lackner (Fraunhofer ISE)	<i>Flexible & high efficiency cells</i>
15h40	Ryan France (NREL)	<i>High efficiency advanced concept cell designs</i>

10' break

Session 2 | Advanced concepts for radiation hardness

15' talks + 5' Q&A

Chairman: David Lackner (Fraunhofer ISE)

16h10	Bruno Boizot (CEA)	<i>Controlling parameters like energy, dose and fluence during solar cells irradiation testing</i>
16h30	Antonino Alessi (LSI-Polytechnique)	<i>Sirius electron accelerator and solar cell test</i>
16h50	Andrea Cattoni (C2N-CNRS)	<i>Recent advances in ultrathin solar cells</i>
17h10	Carla Costa (CEA-INES /ONERA)	<i>Perovskites for space : challenges and advances</i>
17h30	Pilar Espinet (Caltech)	<i>Radiation resistant nanowire solar cells</i>

DAY 2: Solar arrays

Session 3 | III-V solar arrays for space applications

15' talks + 5' Q&A

Chairman: Maite Carreras (OneWeb)

14h00 (CET)	Anderson Bermudez (CEA-INES)	<i>Viability of solar power in various space environment</i>
14h20	Jean-Baptiste Charpentier (CEA-INES)	<i>The mechanics of PV ribbons lengthening induced by thermal cycling</i>
14h40	Emanuele Ferrando (STI)	<i>STI Solar Array product growth</i>
15h00	César Dominguez (IES-UPM)	<i>Micro-concentrator PV architectures for high-efficiency solar generators</i>

10' break

Session 4 | Towards standardization of Space PV: reliability, durability and low cost

15' talks + 5' Q&A

Chairman: Victor Khorenko (Azur Space)

15h30	Philippe Voarino (CEA-INES)	<i>Cubesat : solar array innovations trends</i>
15h50	Vicente Diaz (DHV technology)	<i>Design and qualification of PVA for constellations at DHV</i>
16h10	Maite Carreras (OneWeb)	<i>Solar arrays in the context of mega-constellations</i>
16h30	Julien Gaume (CEA-INES)	<i>Silicon low cost solar arrays</i>
16h50	Paul Zevenbergen (Airbus)	<i>Foldable disruptive solar array technology</i>

10' break

Session 5 | Roundtable: Defining the R&D priorities to answer Space PV industrial challenges

40' Q&A

Chairman: Carlos Algora (IES-UPM)

17h20-18h00	Contributors:	Victor Khorenko (Azur Space)	Paul Zevenbergen (Airbus)	Loris Ibarra (CNES)
		Vicente Diaz (DHV technology)	Ryan France (NREL)	
		David Lackner (Fraunhofer ISE)	Romain Cariou (CEA-INES)	