

# European funding for photonics - The future of photonics in Europe

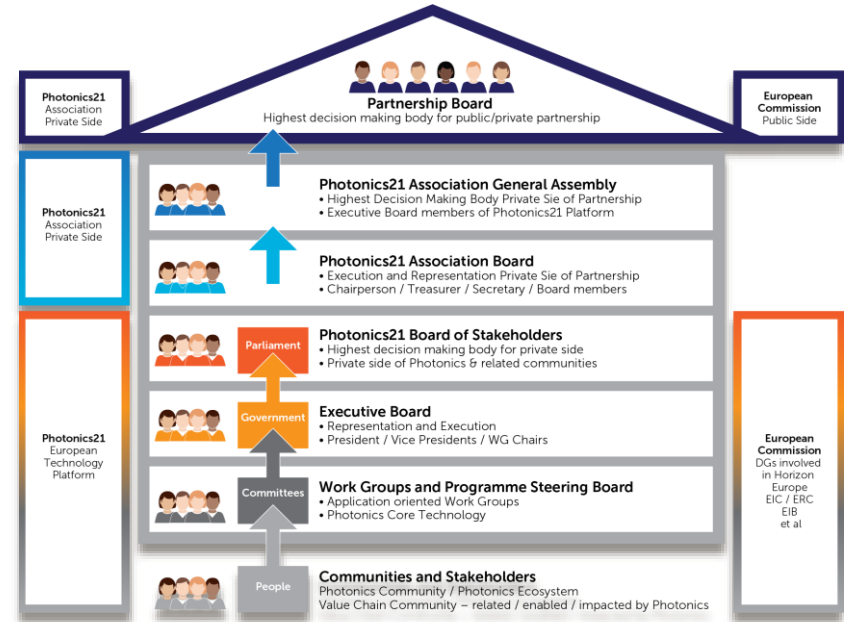
*10 April 2024*

*Sybille Niemeier, Coordinator Photonics21 Secretariat*

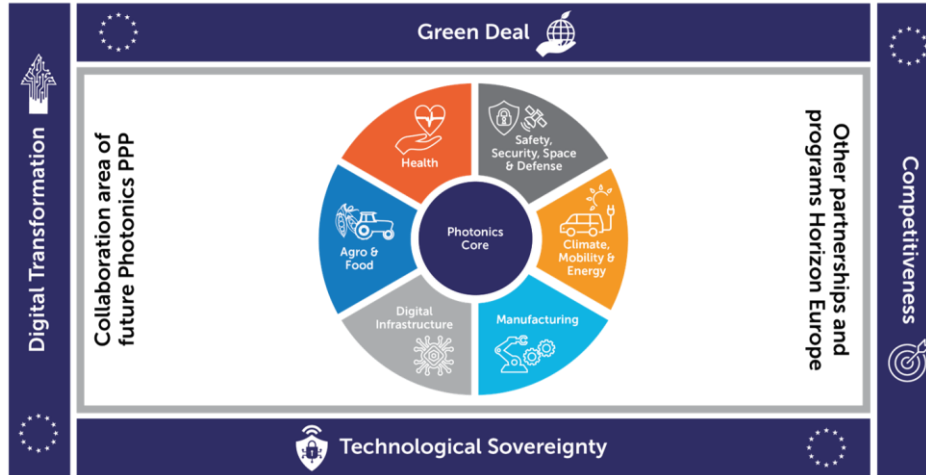


# Photonics21 – EU stakeholder organisation with more than 4000 members from academic research and industry

- Democratic, industry driven, stakeholder organisation following a people-parliament-government principle
- All board positions are elected by the Photonics21 membership
- Membership is open to all and free of charge
- Close cooperation with end-user industry and other deep technologies key to implement strategy



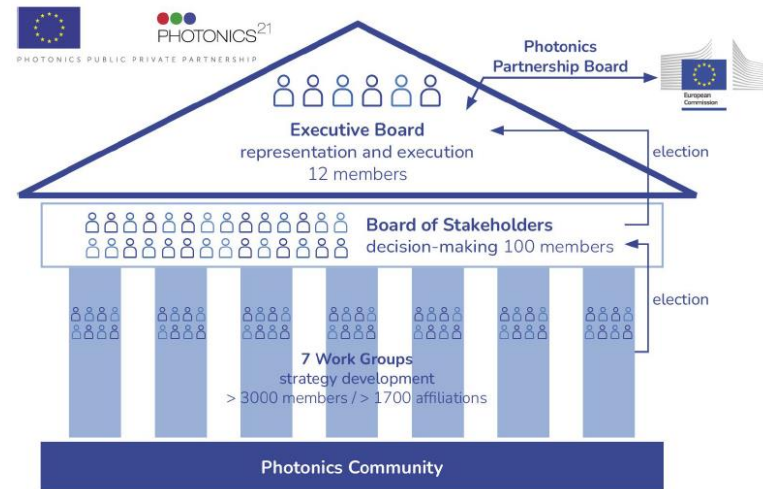
# Photonics21 – Seven Work Group providing expertise to shape the future of photonics in Europe



Creation with other Programme Areas and Partnerships	Health	Digital Infrastructure	Manufacturing	Safety, Security & Defence	Agro and Food	Mobility
Creation with Photonics Stakeholders	<ul style="list-style-type: none"> <li>• Cancer</li> <li>• Opto Genetics</li> <li>• Personalized Medicine</li> <li>• Mobile Biosensors &amp; Image Systems</li> <li>• Photonic Drug Testing</li> <li>• Real Time Proteomics, Genomics, Metabolics</li> <li>• Human centric lighting system</li> </ul>	<ul style="list-style-type: none"> <li>• HPC, IoT, 5G</li> <li>• Cyber Security, Secured Communications</li> <li>• Optical networks// Data Intelligence Hubs for AI</li> <li>• Zero downtime in a terabit economy</li> <li>• Photonics Components for Quantum Computing and Cryptography</li> </ul>	<ul style="list-style-type: none"> <li>• Industry 4.0</li> <li>• Robot cooperation</li> <li>• AI / Machine Learning</li> <li>• for flexible production</li> <li>• Quality control and non-destructive testing</li> <li>• Photonics for Circular Economy &amp; Recycling</li> <li>• Materials for photonic production and photon induced material modification</li> </ul>	<ul style="list-style-type: none"> <li>• Civil Safety &amp; Security</li> <li>• Surveillance &amp; Monitoring Systems,</li> <li>• Non destructive observation systems (e.g. in construction)</li> <li>• Defence Systems</li> <li>• Night Vision, AR, VR, Autonomous Systems</li> <li>• Munition Imaging (mines) and Weapon Guiding Systems</li> </ul>	<ul style="list-style-type: none"> <li>• Precious farming for lower fertilizers, herbicides, fungicides</li> <li>• On the fly 100 % quality control along the food processing value chain</li> <li>• Light based enrichment of substances in plants for medical application and food enrichments</li> </ul>	<ul style="list-style-type: none"> <li>• Autonomous driving systems by sensors, imaging and wireless connectivity</li> <li>• Smart Lighting Systems for enhanced security</li> <li>• Real-time Road (and Track) Control and Traffic Monitoring</li> <li>• Smart City / Smart Parking and Traffic Flow Systems</li> <li>• Logistics</li> </ul>
<b>Core Products and Applications</b>						
<ul style="list-style-type: none"> <li>• Materials for Optical Components &amp; Systems, Production Processes for components, Robots and Human/Robots Cooperation</li> <li>• Materials for Light &amp; Laser Sources, IC, Masks,</li> <li>• Photonic Components and Systems, Lenses, Optical Fibers, PICs, Freeform Optics</li> <li>• Optical Sensors, LIDAR, Spectrometers, High-precision VIS/NIR/MIR/FIR spectroscopy and imagers, Surveillance Systems</li> <li>• LEDs, Nano-LEDs; Human centric lighting system, Low loss LED drivers with sensor functionality and connectivity</li> </ul>						
<b>Core Tasks</b>						
<ul style="list-style-type: none"> <li>• Next Generation Skills Sets: Skill sets &amp; Training - Education and Training</li> <li>• Standards and Regulations</li> </ul>						

# Photonics21 – Advising the European Commission in Photonics Research & Innovation Priorities

- Photonics Partnership with the European Commission since 2014
- Photonics21 officially advises the European Commission on Photonics Research & Innovation Priorities for photonics calls
- Photonics21 consults the European photonics community in an open, transparent and democratic strategy process





# Photonics Partnership in Horizon Europe

## Horizon Europe Photonics Partnership 2021-27

- ~ 340 Mio EUR EC funding
- Partnerships: only instrument to ringfence budget for an area

PILLAR II – Global challenges & European industrial competitiveness				PILLAR III – Innovative Europe	
Cluster 1: Health	Cluster 4: Digital, industry and space	Cluster 5: Climate, energy and mobility	Cluster 6: Food, bioeconomy, natural resources, agriculture and environment	EIT: The European Institute of Innovation and Technology	European innovation ecosystems
Innovative Health Initiative	Key Digital Technologies	Clean Hydrogen	Circular Bio-based Europe	EIT InnoEnergy	Innovative SMEs
Global Health EDCTP3	Smart Networks and Services	Clean Aviation	Biodiversa+	Climate-KIC	
Transformation of Health Care Systems	High Performance Computing	Single European Sky ATM Research 3	Blue Economy	EIT Digital	
Risk Assessment of Chemicals	European Metrology (Art. 185)	Europe's Rail	Water4All	EIT Food	
ERA for Health	AI-Data-Robotics	Connected, Cooperative and Automated Mobility	Animal Health and Welfare	EIT Health	
Rare Diseases	Photonics	Batteries	Accelerating Farming Systems Transitions	EIT Raw materials	
One-Health Antimicrobial Resistance	Made in Europe	Zero-emission Waterborne Transport	Agriculture of data	EIT Manufacturing	
Personalised Medicine	Clean Steel – Low-Carbon Steelmaking	Zero-emission Road Transport	Safe and Sustainable Food Systems	EIT Urban Mobility	
Pandemic Preparedness	Processes4Planet	Built4People		Cultural and Creative Sectors and Industries	
	Globally Competitive Space Systems	Clean Energy Transition			
		Driving Urban Transitions			
				<b>CROSS-PILLARS II and III</b>	
				European Open Science Cloud	

- Institutionalised partnerships (Art 185/7, EIT KICs)
- Co-programmed
- Co-funded
- Not covered in the BMR 2022 due to a later start date



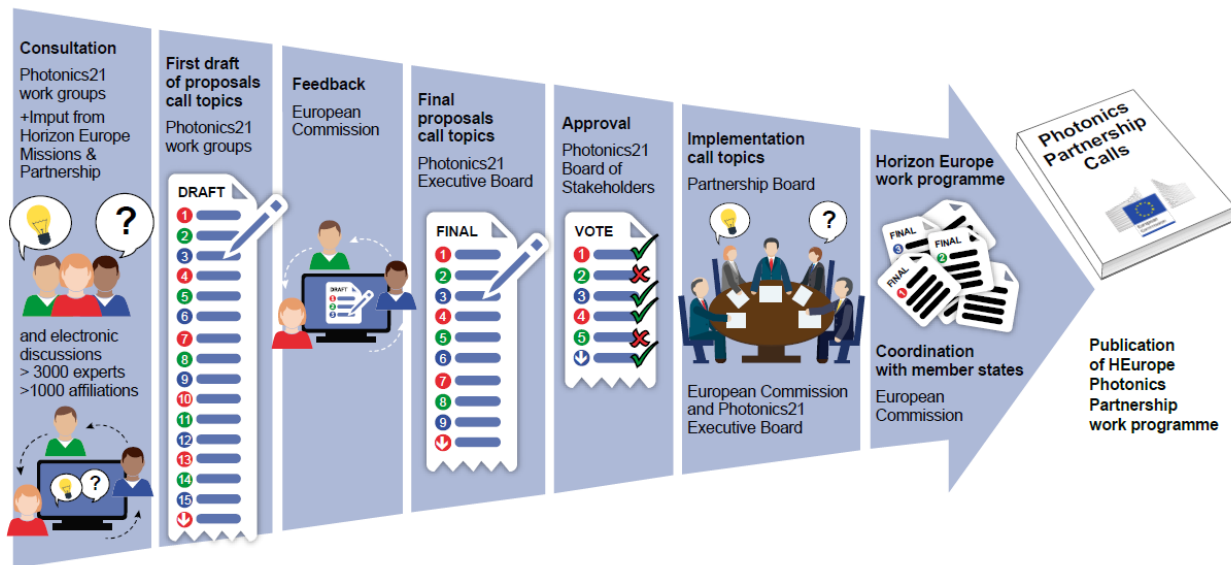
# Photonics Partnership call topics 2025 & 2026/27



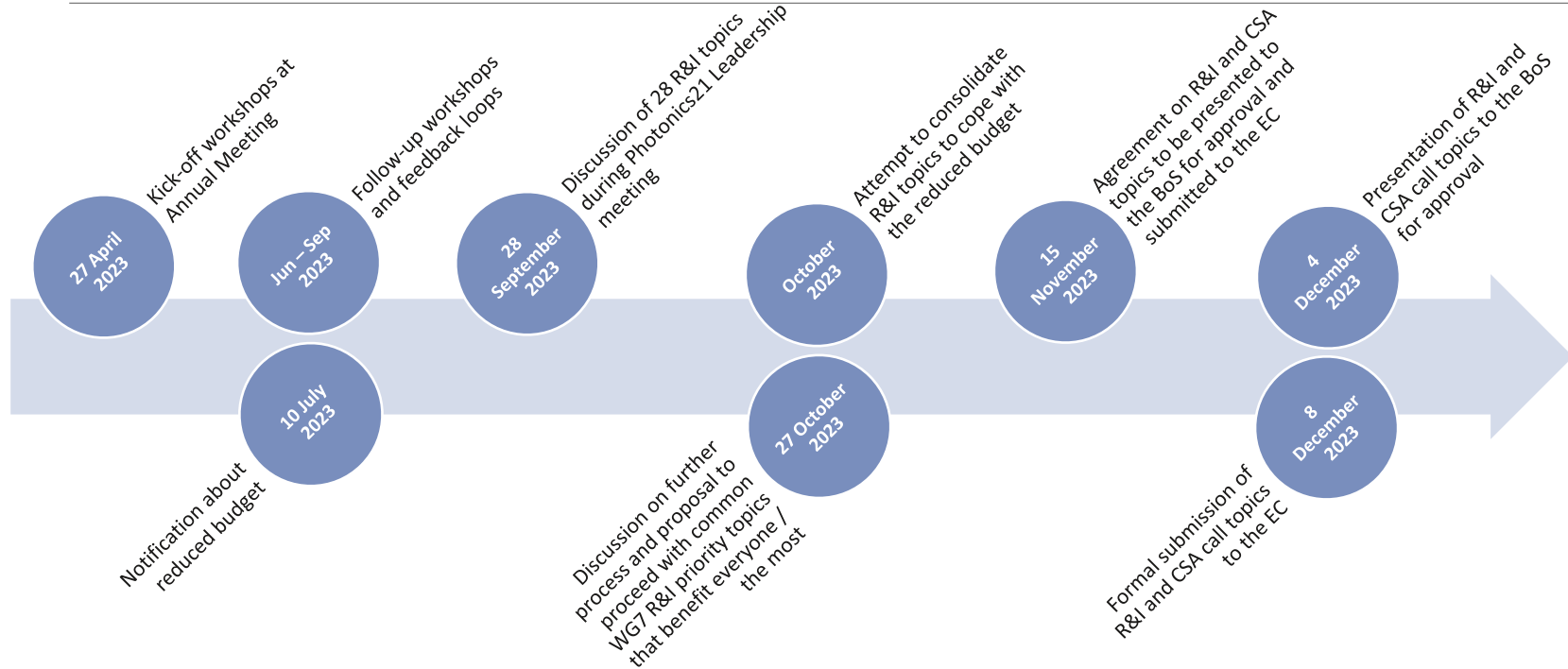
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# Photonics21 – member consultations for setting Photonics Partnership call priorities

## Photonics21 Strategic Research & Innovation Agenda



# Photonics21 – Steps toward Photonics Partnership call priorities 2025 & 2026/27



Consultation process of the EC  
and the Member States



# Photonics21 – Proposed Photonics Partnership call topics for Work Programmes 2025 & 2026/27 (proposals by private side)

Topic	Type	TRL	Budget in M€	Year	Partner/ Notes	Link to WGs
Development of active sensor technologies and multimodal sensor integration for multiple application domains	IA	TRL > 5	15-20	2025		3, 4, 5, 6, 7
Ultra-high efficiency photonics	IA	TRL > 5	15-20	2026		1, 3, 4, 5, 6, 7
Extended functionality in integrated photonics	RIA	TRL 1-5	15-20	2027		1, 2, 3, 4, 7
Photonics21 Secretariat	CSA		3.0	2026		
Joint application call (tbd)	tba	tba	10-15	2025	tba	tba
Joint application call (tbd)	tba	tba	10-15	2026	tba	tba
Joint application call (tbd)	tba	tba	10-15	2027	tba	tba
Sustainable, environmentally friendly manufacturing of photonic components and systems	IA	TRL > 5	tba	tba	Chips JU	1, 2, 3, 4, 7
Pilot lines and competence centres for advanced integrated photonics and PIC technologies, including electronic-optical systems	IA	TRL > 5	tba	tba	Chips JU	1, 2, 3, 4, 7
Co-design and manufacture of photonic components and systems with microelectronics and complementary technologies	RIA	TRL 1-5	tba	tba	Chips JU	1, 2, 3, 4, 7

# EC & Members States – Consultation process for the Horizon Europe Work Programmes 2026-2027

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- A schedule has not yet been announced.
- Photonics Partnership proposals already submitted
  - Ultra-high efficiency photonics
  - Extended functionality in integrated photonics
- Based on experience it is assumed that proposals for joint call shall be submitted in autumn 2024.

# Photonics21 & the Chips Act





# The European Chips Act in a nutshell

The European Chips Act will ensure that the EU strengthens its semiconductors ecosystem, increases its resilience, as well as ensure supply and reduce external dependencies.



1. Strengthen Europe's research and technology leadership towards smaller and faster chips



2. Build and reinforce capacity to innovate in the design, manufacturing and packaging of advanced chips



3. Put in place a framework to increase production capacity to 20% of the global market by 2030



4. Address the skills shortage, attract new talent and support the emergence of a skilled workforce



5. Develop an in-depth understanding of the global semiconductor supply chains

The Chips Act should result in additional public and private investments of more than **€15 billion**.

These investments will complement:

- **existing programmes** and actions in research & innovation in semiconductors (Horizon Europe, Digital Europe programme)
- **announced support** by Member States.

In total, **more than €43 billion of policy-driven investment will support the Chips Act until 2030**, which will be broadly matched by long-term private investment.

Source: EU Commission



# Chips Act: Chips Joint Undertaking Launch Event



European Council  
Council of the European Union

Home > Press > Press releases

Council of the EU Press release 25 July 2023 10:20

## Chips Act: Council gives its final approval

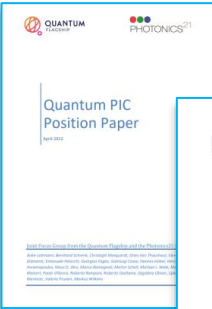
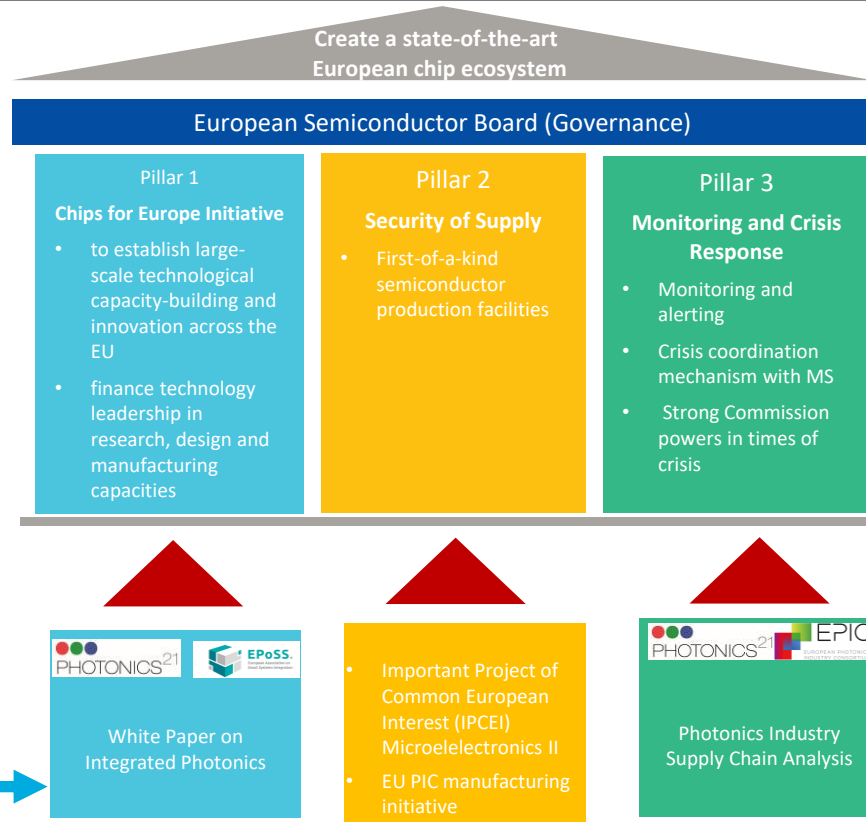
The Council has today approved the regulation to strengthen Europe's semiconductor ecosystem, better known as the 'Chips Act'. This is the last step in the decision-making procedure.

The Chips Act aims to create the conditions for the development of a European industrial base in the field of semiconductors, attract investment, promote research and innovation and prepare Europe for any future chip supply crisis. The programme should mobilise €43 billion in public and private investment (€3.3 billion from the EU budget), with the objective of doubling the EU's global market share in semiconductors, from 10% now to at least 20% by 2030.

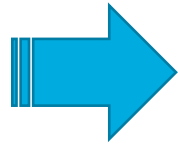
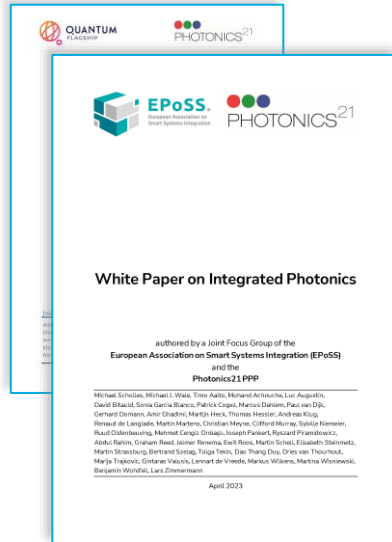
### Infographic - The EU Chips Act

The infographic consists of two parts. The top part shows a 3D rendering of a green semiconductor chip. The bottom part is a network diagram with several green circular nodes connected by thin lines, symbolizing a global or interconnected system.

# European Chips Act - Photonics21 contributing to Pillar 1 & 3



# Chips Act: Integrated Photonics recognized in the ECS Strategic Research and Innovation Agenda



- Integrated Photonics
  - New materials for active photonic devices, such as 2D materials, Lithium Niobate, Indium Phosphide; for improved performance, such as higher bandwidth in modulators, and detectors.
  - Light sources (e.g. lasers and laser modules) with higher power and better performance and with tunable wavelength, using external cavity on photonic integrated circuits (PIC).
  - New waveguide materials and components to expand the wavelength range from UV up to mid IR optical elements for beam shaping and manipulation (like ultrathin curved waveguides, meta-lenses, tunable lenses and filters, next generation holograms, ultra-wide-angle holograms)
  - Display technologies (like micro-LEDs, MEMS-mirrors, Phase Arrays) and sensors (e.g. for eye tracking)
  - New devices for Quantum PICs

- Communications:
  - Module-level high-speed wireless communication features, including current and new frequency bands.
  - High-speed **photonics** communications modules beyond 1 Tb/s.

- Integrated Photonics and co-integration with electronics
  - Photonic-electronic system integration based on integrated photonics, including high-speed RF electronics, MEMS/NEMS sensors, etc.

- Multi-domain electro-photonic integration and electro-optic co-packaging.
- Wafer-level integration of photonic and electronic components for smart emitters and detectors
- Enabling electronic-photonic systems by heterogeneous integration of active components on PICs (III-V semiconductors, ferroelectrics, ultra-low-loss waveguide materials).
- Heterogeneous integration processes and equipment for integrated photonics including high-precision component placement and bonding
- Quantum PICs: Integration of single photon device system in PICs.

### Topic 1.3: Integrated photonics

- Novel devices operating at different wavelengths than used for telecom
- Co-packaging and integration of integrated photonics and high-speed electronics
- Photonic health and medical sensors

- Tunable laser sources for PICs
- Materials and devices for Quantum PICs
- optical elements for beam shaping and manipulation (like ultrathin curved waveguides, meta-lenses, tunable lenses and filters, next generation holograms, ultra-wide-angle holograms)
- display technologies (like micro-LEDs, MEMS-mirrors, Phase Arrays) and sensors (e.g. for eye tracking)

- Growth of light-emitting structures on silicon and integration into photonic platforms
- Analogue and Neuromorphic photonic computing



# Join the Photonics Partnership Annual Meeting 2024

## Shape the future of photonics in Europe!

### Photonics Partnership Annual Meeting 2024

14 – 15 May 2024

DoubleTree by Hilton Brussels City Hotel



PHOTONICS PUBLIC PRIVATE PARTNERSHIP



#### Why attend

- Be part of a high-level panel discussion "Quo Vadis Photonics?"
- Get information on funding opportunities in other European partnerships or initiatives
- Learn about the economic performance of photonics on a global scale
- Network and develop new ideas for future Photonics R&I projects

#### Register now!

Early bird rates and sponsoring opportunities available at [www.photonics21.org](http://www.photonics21.org)



# Thank you!!

**Contact:** [secretariat@photonics21.org](mailto:secretariat@photonics21.org)

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