



To Photonics21 Secretariat
via eMail: secretariat@photonics21.org

Dear Photonics21 Secretariat,

We herewith submit the nomination of the following Photonics21 Board of Stakeholders candidate
Politecnico di Milano / Barbara Previtali.

**- Letter of Nomination -
Photonics21 Board of Stakeholders
Election 2024**

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1. Full legal name of the affiliation nominated as BoS Member (candidate's organisation):

Politecnico di Milano

2. Full contact details of the affiliation (street, postal code, country) nominated as BoS Member and invoice address *(In accordance with the Terms of Reference §5, which the Affiliation acknowledges having received, an Annual Service fee will be invoiced every year during the first quarter to the BoS Member. By signing the present letter, the BoS candidate agrees to pay this Membership Fee. The Fee will be considered an asset of the Photonics 21 AISBL in accordance with its statutes (article 12b).)*

Piazza Leonardo da Vinci 32
20133 Milano
Italy

3. Name of the suggested BoS Representative (the personal candidate)

Prof. Barbara Previtali

4. Information about the BoS candidate and the BoS representative

a) Description of the activities and information about the expected contribution and value added the nominated BoS member (candidate's organisation) will bring to the BoS¹

Politecnico di Milano, founded in 1863, is the Italy's largest public school for engineering, architecture, and design. It has two main campuses in Milan and five branches in Lombardy. The university includes 12 academic departments, 6 schools, and nearly 48,000 students, including 8,200 international students and 1,893 PhD candidates. According to the QS 2025 ranking, Politecnico di Milano is Italy's top university and ranks 111th worldwide.

Politecnico di Milano strives for excellence in **high-quality education** and **innovative research** by supporting advanced research, forming global academic and industry partnerships, addressing societal challenges through interdisciplinary research, and integrating scientific developments into education. Research spans various fields, with **Photonics** being **crucial** across **strategic areas**. This includes fundamental studies, industrial research, and technology transfer, often in collaboration with Italian and European companies. Photonics research is also part of national and international projects and academic partnerships. Moreover, Photonics is integrated into many Engineering bachelor's and master's degree and PhD programs.

Key examples in **Photonics** at Politecnico di Milano include developing advanced laser technologies for precision and additive manufacturing, as well as innovative photonic methods for non-invasive medical diagnostics, from fundamental research to clinically validated

¹ The candidate is aware and accepts that according to the Photonics21 Terms of Reference (§ 5 (10) a membership fee - as determined by the General Assembly of the Association - needs to be paid to the Photonics21 association.

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prototypes. Politecnico also focuses on designing scalable, integrated optical circuits crucial for telecommunications, quantum information, data processing, and sensors, leading to more compact and efficient photonic devices. Additionally, light-based non-destructive diagnostics are applied in industries like automotive and cultural heritage preservation.

Through these diverse initiatives, the Politecnico di Milano not only advances scientific understanding but also contributes to practical applications in industry, telecommunications, cultural heritage, medicine, and healthcare, to name a few, showcasing the extensive impact of photonics.

Politecnico di Milano aims to lead in **research** and **innovation** by building strong, lasting relationships with enterprises. Key achievements include over €100 million in third-party funding, 3,408 patents, and 116 spin-off companies since 2000, with 82 still active. It is Italy's top university and ranks 5th in Europe for Horizon Europe projects, securing 294 funded projects and 75 ERC grants, totalling around €145.3 million as of July 2024.

Politecnico di Milano's commitment to linking research and innovation with education has led to **high-quality international results** and strong ties with the business world. The university actively promotes internationalization, with many programs taught in English. Over 40% of MS students and 30% of PhD students are international. Politecnico is also part of several strategic alliances with top global universities, including IDEA League, Unitech, Alliance4Tech, T.I.M.E., MEDes, Pegasus, Global E3, and Athens. By its ability to tackle the main scientific and technological challenges according to an ethical dimension that interprets and declines the very concept of sustainability as a synonym for **equity, inclusion** and **shared growth**.

Politecnico di Milano promotes gender inclusion and equal opportunities in STEM through its "POP - Pari Opportunità Politecniche" initiative, which offers outreach, scholarships, and mentorship to encourage female participation. Beyond POP, Politecnico supports gender diversity through the LENARDO 4.0 program, participation in STEMintheCity, and the Girls@Polimi initiative, which guides high school girls into STEM fields. It also fosters Women in STEM networks and implements a Gender Equality Plan to improve gender balance across the institution.

- b)** Description of the activities and information about expected contribution and value added the BoS Representative (candidate / person) will bring to the BoS.

Barbara Previtali is Full Professor at Politecnico di Milano - Department of Mechanical Engineering. Since 2009, she has been leading SITEC—Laboratory for Laser Applications, a research group and laboratory dedicated to laser processes and their applications. In recent years, she has played a key role in introducing laser processes within AddMe_Lab, the laboratory for metal additive processes in the Department of Mechanical Engineering, where she has also participated in co-chairing its activities. Today, the research group she leads consists of 1 Full Professor, 1 Associate Professor, 4 Assistant Professors, and around twenty PhD students and research fellows.

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Her research focuses on modeling, optimization, and control of advanced laser manufacturing technologies, with a particular emphasis on laser-based additive manufacturing (L-Powder Bed Fusion and Laser Metal Deposition). She investigates innovative laser sources with adaptable beam properties across time, space, and wavelength to fine-tune the interaction between laser and material. This is achieved through multiphysics modeling, experimental validation using custom setups or industrial machines, and monitoring via integrated sensors. Her work spans a range of applications, from fundamental research in laser processes like LIBS in open-air and in-line and challenging alloys such as pure zinc in L-PBF, to optimizing and industrializing established processes like laser cutting (including the development of closed-loop for quality control), welding of car body frame and electric engines, battery processing for e-mobility, and automated on-site production for civil engineering. On these topics, she has authored and co-authored of about 255 papers, with 135 published in peer-reviewed international journals and 120 presented at international conferences. Additionally, she holds nearly 15 national and international patents, most of them co-authored with industrial companies.

In 2020 she was co-founder of the Laser Safety School, an Italian platform for education, research, and outreach in laser safety, supported by 10 major Italian industrial partners along with all the members from the academic institutions of PromozioneL@ser (a branch of AITeM Association). In the same year she also became a member of the Italian Technical Committee CT 76 "Sicurezza delle radiazioni ottiche e apparecchiature laser", part of the Comitato Elettrotecnico Italiano (CEI) under the International Electrotechnical Commission (IEC).

Additional Notable Roles and Affiliations:

- Since 2023: Jury Member of the Berthold Leibinger Innovationspreis
- Since 2022: Panel Member of the FWO organisation (Flanders) in the PHD fellowship strategic basic research SBWTA7A
- Since 2017: Scientific Advisory Board Member of MAPP (Manufacturing using Advanced Powder Process), EPSRC, UK
- Since 2014: Academic Responsible, Group 2-Industrial Manufacturing, CORIFI (Italian Photonics Platform)
- Associate Editor of the Journal of Optics and Laser Technology, Elsevier
- Senior Editor of the Journal of Laser Applications, AIP Publishing
- Member, Italian Association for Manufacturing (AITeM), Photonics21, and Laser Institute of America (LIA)

Since 2013 Barbara Previtali has actively participated to the Photonics 21 Work Group 2 - Manufacturing.

Building on the initiatives led by Prof. Paola Taroni as the representative of Politecnico di Milano, if elected, Barbara Previtali will contribute to:

- **Advance photonics Research:**
 - Identify and advocate for key research priorities that drive innovation in photonics in Europe.
 - Facilitate the transition of research into practical industrial applications.
- **Leverage Educational Expertise from a leading technical university:**

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- Share best practices from Politecnico di Milano to enhance photonics education across Europe.
- Develop specialized training programs to equip professionals with the latest photonics skills.
- Support the integration of photonics into engineering and science curricula.
- **Expand Collaboration Networks:**
 - Act as a bridge between academia, industry, and government to foster innovation.
 - Increase visibility and collaborative opportunities between European and photonics communities through conferences and events.
- **Sustain Photonics as a Key Technology:**
 - Advocate for photonics as a critical enabling technology within European policy frameworks.
 - Integrate photonics into key European industries, reinforcing its industrial relevance.
 - Influence standardization to support the growth of photonics.
- **Promote Equal Opportunities:**
 - Increase representation of women and underrepresented groups in photonics through mentorship and outreach.
 - Foster inclusive environments in education and industry for diverse talent in photonics.
 - Advocate for gender equality and diversity within Photonics21 initiatives.