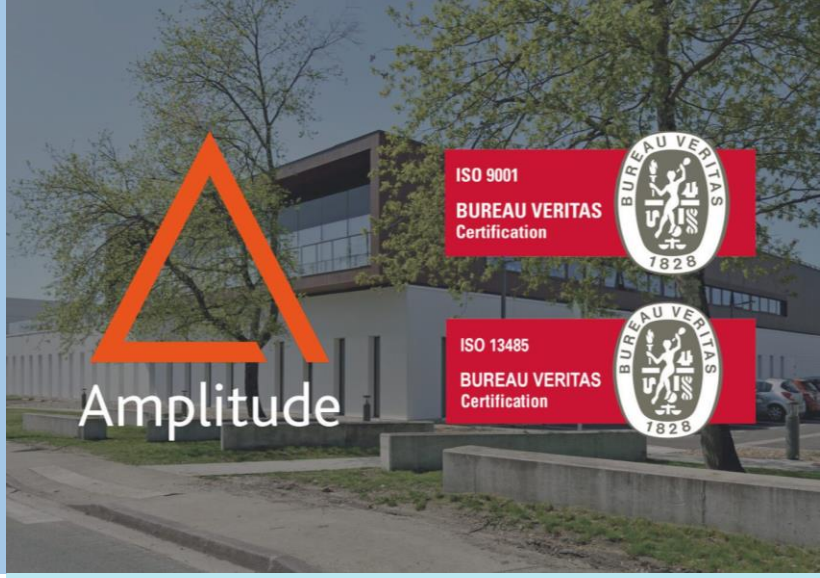
AMPLITUDE FRANCE



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- **Address**

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- **Scientist in charge**

Michele Natile

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Anna Golinelli

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Useful Links

https://quatto.eu/

https://amplitude-laser.com/

Home Institution

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Founded in 2001, Amplitude is a recognized leader in the femtosecond laser community, specializing in ultrafast laser solutions for industrial, medical, and scientific applications. Our approach combines advanced research and innovation with industrial reliability, supporting partners from the initial concept stage through to implementation. Amplitude operates multiple manufacturing and service sites in Europe, Asia, and the United States, along with regional offices worldwide, ensuring proximity and high-quality service for customers. Amplitude fosters innovation through strong collaborations with academic institutions. Since 2015, Amplitude has shared a joint laboratory with the Laboratoire Charles Fabry (LCF), resulting in 10 completed PhD theses, 6 patents, and over 40 scientific publications.

Useful Links

https://amplitude-laser.com/

https://www.lcf.institutoptique.fr/groupes/lasers/labo-commun

Group Leader

Michele Natile

- **Graduation:** Degree in Physics engineering from the Politecnico di Milano, Italy with specialization on optics and photonics (2015).
- **PhD**: PhD in Physics from Univeristé Paris Saclay, France, focusing on ultrafast optics (2019).
- **Current Position**: R&D laser engineer.
- I obtained my Ph.D. within the framework of the MSCA Doctoral Network MEDEA. Afterward, I joined the R&D department on a permanent basis, focusing on Yb-doped high-power lasers and nonlinear optics-based add-on modules. Since 2021, I have been leading the joint laboratory Amplitude–Laboratoire Charles Fabry, located at the Institut Optique Graduate School in Palaiseau, France.My research interests include ultrafast optics, nonlinear optics, nonlinear pulse compression, carrier-envelope phase control, and optical parametric amplification (OPA).

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Group Leader

Anna Golinelli

- **Graduation:** Degree in Physics engineering from the Politecnico di Milano, Italy with specialization on optics and photonics (2014).
- **PhD**: PhD in Physics from Univeristé Paris Saclay, France, focusing on ultrafast optics (2019).
- **Current Position**: Sales manager.
- I completed my PhD within the framework of the MSCA Doctoral Network MEDEA, in a joint laboratory between CEA and Amplitude, where I focused on optimizing laser performance for attosecond science. After a brief postdoctoral position at the Amplitude–Laboratoire Charles Fabry joint lab, I transitioned my interests toward sales and business development. Since 2023, I have been leading the Sales Department for Advanced Laser Solutions at Amplitude.

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Research Training Modules

Design of high-power non-linear compression system

Nonlinear compression techniques are widely used to shorten pulse duration at the output of laser systems and to overcome the intrinsic amplification bandwidth limitations of laser sources. This approach enables access to the few-cycle regime, which is essential for attosecond science laser drivers.

The principle relies on self-phase modulation (SPM), achieved through the interaction of the laser pulse with a solid or gaseous medium. This process broadens the pulse spectrum, allowing subsequent compression to a significantly shorter duration.

One of the most effective implementations of this technique uses a gas-filled Herriott cell, commonly referred to as a Multi-Pass Cell (MPC). The main advantage of this configuration is its very high throughput (>90%) combined with a compact and stable design.

Amplitude is among the first companies to offer an industrial-grade product based on this approach: Compress.

Useful Links

https://amplitude-laser.com/add_ons/pulse-management/compress/

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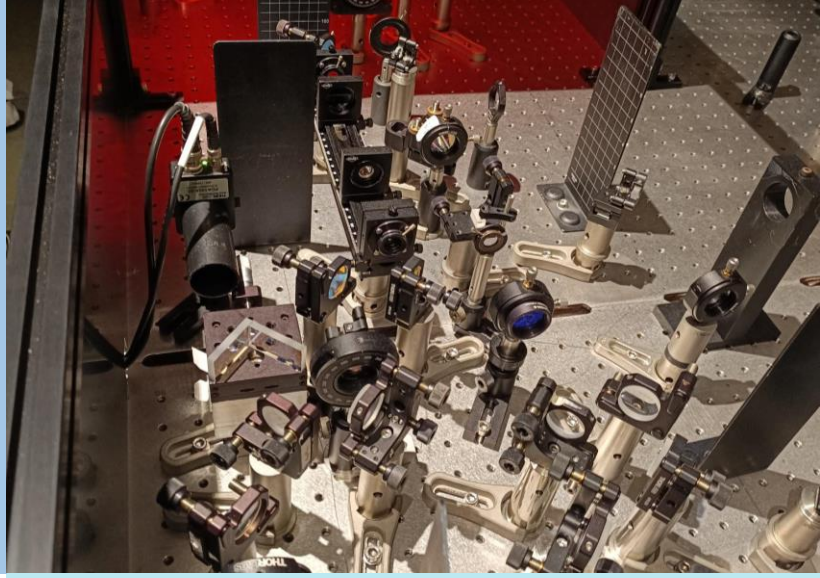
Research Training Modules



Optical Parametric Amplification (OPA) Design

OPA is a key technique for generating high-energy, ultrashort pulses with broad bandwidth, overcoming the limits of conventional laser gain media. It works through nonlinear interaction in a crystal, where a pump pulse transfers energy to a signal pulse while creating an idler wave. This process avoids thermal load and supports scalability to high peak powers.

Phase matching in the crystal determines bandwidth and efficiency, requiring precise control of orientation and temperature. Multi-stage OPA systems, often combined with chirped-pulse amplification, enable amplification of broadband seeds while preserving pulse quality. The main advantages are wide gain bandwidth, high conversion efficiency, and flexibility across wavelengths—ideal for few-cycle pulse generation in attosecond science.

Amplitude has extensive experience in OPA and OPCPA systems, further reinforced by the acquisition of Fastlite in 2023.

Useful Links

https://amplitude-laser.com/products_category/opa_and_opcpa_products/

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Transferable skills modules

How to manage an industrial project

Amplitude proposes a unique, hands-on training experience for PhD students, working side by side with our industrial teams—sales, supply chain, process engineering, and project management. This immersive approach provides direct exposure to real-world challenges and decision-making in complex industrial environments.

Participants will learn how projects are structured, monitored, and optimized across different functions, gaining practical insights into resource planning, risk management, and cross-department collaboration. The goal is to bridge academic knowledge with industrial practice, equipping future professionals with the skills to lead projects efficiently and strategically.

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Life in Paris

Paris is a cosmopolitan city at the heart of Europe, renowned for its cultural heritage and academic excellence. Combining history, innovation, and a dynamic urban lifestyle, Paris offers an inspiring environment for research and study. As a PhD student, you'll benefit from an extensive public transportation network, a strong international community, and access to world-class libraries, museums, and cultural events. The city's diverse neighborhoods are filled with cafés, bookshops, and spaces for intellectual exchange, making it easy to connect with fellow researchers. Whether you're attending a seminar at a leading institution or enjoying a walk along the Seine, Paris provides a unique balance between academic focus and quality of life. It is a city where science and culture meet, creating an ideal setting for living and learning.

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