

# Horizon 2020 / Marie Skłodowska-Curie Actions (MSCA)

Marie Curie Individual Fellowship (MSCA-IF)  
Research and Innovation Staff Exchange (RISE)

Thibault J.-Y. Derrien

Group lead "Ultrafast Photonics"  
Department of Scientific Laser Applications (SLA)  
HiLASE Centre, Institute of Physics (AS CR), Dolní Břežany, Czech Republic

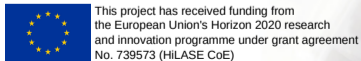
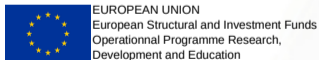
Webinar  
February 2024, 6th



MAX-PLANCK-GESELLSCHAFT

<derrien@  
fzu.cz>

- 2019-2024 EU-H2020-MSCA-RISE** European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 823897. Project "ATLANTIC" (2019-2024).
- 2017-2023 European Regional Development Fund** and the **state budget of the Czech Republic** (project **BIATRI**: CZ.02.1.01/0.0/0.0/15\_003/0000445, project **HiLASE CoE**: No. CZ.02.1.010.00.015 0060000674, programme NPU I: project No. LO1602).
- 2018 European Research Council** (ERC-2015-AdG-694097), Grupos Consolidados (IT578-13), and European Union's H2020 program under GA no.676580 (NOMAD).
- 2015-2017** European Union's Horizon 2020 research and innovation programme under the **Marie Skłodowska-Curie Actions Individual Fellowship** grant agreement No 657424. Project "QuantumLaP" (2015-2017).



- 1 Introduction  
Speaker
- 2 2015-2017: Marie Curie Individual Fellowship (MSCA-IF)  
Preparation phase  
Ingredients before writing  
Implementation
- 3 2019-2023: Research and Innovation Staff Exchange (MSCA-RISE)  
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Preparation phase  
Identifying strengths of the network  
/!\ Filtering bad partners  
Project implementation  
Budget implementation  
Actual timeline of the project  
Secondments: the ultimate reward  
2019 June: 1 month in Japan  
2019 Aug. - Sept.: visitors from Belarus, Uzbekistan, Russia
- 4 Outcomes on career
- 5 Acknowledgments

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# Life scattering diagram



Personal scattering process.

Thibault J.-Y. Derrien, French, 39 years old.

**2008.** Master degree Plasma Physics (U. Paris-Saclay/Ecole Polytechnique, France).

**2012.** PhD degree, Aix-Marseille University, LP3 / CNRS, Marseille (France).

**2012.** Lab. Hubert Curien LabHC / CNRS, St-Etienne (France).

**2013.** BAM Fed. Inst. Mat. Res. Test., Berlin (Germany).

**2015. Marie Curie Individual Fellow "QuantumLaP"** at HiLASE Prague (Czech Republic).

**2017. Senior researcher @ FZU (Prague)**

**2018.** Post-doc (70%) at **Max Planck Institute** (MPSD Hamburg, Germany)

**2019. Marie Curie RISE "ATLANTIC"** networking program (Prague, Czech Republic)

**2021. Group leader "Ultrafast photonics" @ FZU Prague.**

15 years research experience

Stayed (0.5 - 10) years in 8 EU research laboratories, multi-cultural environments, 6/8th experimental groups.



Thibault J.-Y. Derrien

FOLLOWING

HILASE Centre, [Institute of Physics](#), Czech Academy of Sciences

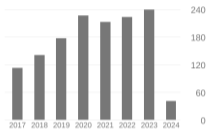
Verified email at fzu.cz - [Homepage](#)

[Laser](#) [nanostructures](#) [plasmonics](#) [density functional theory](#) [non-linear dynamics](#)

<input type="checkbox"/>	TITLE	CITED BY	YEAR
<input type="checkbox"/>	<p><b>High-speed manufacturing of highly regular femtosecond laser-induced periodic surface structures: physical origin of regularity</b>                      I Grnitskiy, TJY Derrien, Y Levy, NM Bulgakova, T Mocek, L Orazi                      Scientific reports 7 (1), 8485</p>	292	2017
<input type="checkbox"/>	<p><b>Fundamentals of ultrafast laser–material interaction</b>                      MV Shugaev, C Wu, O Armbuster, A Naghlou, N Brouwer, DS Ivanov, ...                      MRS Bulletin 41 (12), 960-968</p>	225	2016
<input type="checkbox"/>	<p><b>Possible surface plasmon polariton excitation under femtosecond laser irradiation of silicon</b>                      TJY Derrien, TE Itina, R Torres, T Sarnet, M Sentis                      Journal of Applied Physics 114, 083104</p>	178	2013
<input type="checkbox"/>	<p><b>Plasmonic formation mechanism of periodic 100-nm-structures upon femtosecond laser irradiation of silicon in water</b>                      TJY Derrien, R Koter, J Krüger, S Höhm, A Rosenfeld, J Bonse                      Journal of Applied Physics 116 (7), 074902</p>	123	2014

Cited by [VIEW ALL](#)

	All	Since 2019
Citations	1621	1124
h-index	17	15
i10-index	23	20



Public access [VIEW ALL](#)

1 article not available | 11 articles available

Based on funding mandates

## Web Of Science

- H-index (WOS): 14.
- Publications: 39 (WOS). 2 patents (CZ, EU). 2 chapters in monographs.
- Number of citations: 1178 (WOS).



Hilase Centre, Dolni Brezany, close to Prague.

Hilase: "Super lasers for the real world."

<http://www.hilase.cz/en/>

# Maria Salomea Skłodowska-Curie

- 1867 Born in Warsaw.
- 1891 Moved to Paris to run away from too limiting freedom for women in society.
- 1893 Bachelor of Physics, Paris.
- 1894 Meeting with Pierre Curie.
- 1897 Starts PhD thesis in France.
- 1902 PhD defense.
- 1903 Nobel Prize of Physics.
- 1911 Nobel Prize of Chemistry.
- 1934 Died in Paris.

## Key features

- Extreme and long-term motivation.
- Capability of making compromises / sacrifices.
- Free-thinking, independence.
- Mobility.
- Perseverance.



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**Objective** "[...] to enhance the creative and innovative potential of experienced researchers, wishing to diversify their individual competence in terms of skill acquisition through advanced training, international and intersectoral mobility. Individual Fellowships provide opportunities to acquire and transfer new knowledge and to work on research and innovation in a European context (EU Member States and Associated Countries) or outside Europe. [...]"

**How?** Via supporting "the best or most promising researchers of any nationality, for employment in EU Member States or Associated Countries."

## Strict mobility condition

At submission deadline, you must have been in country since LESS that 1 year!

## Preparation

You should apply for going to another country.  
And use the **secondment** period as a training for developing a new competence.

# Rigid mobility condition

## Place of activity/place of residence (previous 5 years - most recent one first)

Indicate the period(s) and the country/contries in which you have legally resided and/or had your main activity (work, status, ..) during the last 5 years up until the deadline for the submission of the proposal. Please fill in this section without gaps, until the call deadline (11/09/2014).

Period from	Period to	Duration (days)	Country	Add
01/07/2014	11/09/2014	73	Czech Republic	Remove
01/02/2013	30/06/2014	515	Germany	Remove
11/09/2009	31/01/2013	1.239	France	Remove
		Total	1827	

Taken from project proposal EU-H2020-MSCA-IF-2014 "QuantumLaP".

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2012 PhD supervisor mentioned about prestige for MSCA and Max Planck Institute. Too small CV.

Jan 2014 Researcher from Max Planck Institute proposed me to write a Marie Curie application.

- Read the whole document very carefully. Secondment period is a key for the grant to make sense.
- "How can I reorganize my life to make it work ?"
- **Prepare yourself on possible consequences of mobility:** necessary concessions / sacrifices,
  - leaving your current country (distant relationships),
  - getting a lower salary,
  - going into unexpected new country with unknown language, ...
- Who would be the best support for your project ? the **best supervisors to realize my dream?**

## Czech koruna (CZK)

Latest (27 March 2019): EUR 1 = CZK 25.797 +0.028 (+0.1%)

Change from 28 March 2013 to 25 November 2014

Minimum (7 October 2013): 25.513 - Maximum (19 August 2014): 28.004 - Average: 26.880

Select: EUR vs. CZK



From: 28-03-2013 to: 25-11-2014

Zoom: 1m 3m 6m 1y 2y 5y 10y all



**10/2013** Federal German elections: federal contract not renewed (→Apr 2014). Started exploration in numerous Berlin labs.

**11/2013** A friend came to visit me in Berlin. We met a couple of scientists in a Mexican restaurant, Kreuzberg, Berlin ([key random event](#)).

**31/01/2014** Invited seminar at Theory Group of Fritz Haber Institute (FHI) on my favorite topics.

**14/02/2014** Invitation to FHI workshop, Interview with Prof. Angel Rubio. [Proposed me to apply for MSCA](#).

**14/02/2014** Invitation to join Hilase (FZU Prague) by N.M. Bulgakova. [Fits the mobility condition!](#)

**15/05/2014** Failure of Czech National Call, despite that Prof.'s project won competition →a number of open research positions were suppressed. Open letters in the Czech press.


**16/05/2014** "Okay", let's write a Marie Curie fellowship!"  
⇒Invited to join the lab by director of Hilase.

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## Collecting the key ingredients...

- ✓ Ready for mobility, personal preparation.
- ✓ Aware of my dream topic since 2010: compute laser excitation of materials both classically and quantumly.
- ✓ Topic with great fundamentals, high potential for real-world applications, a further economical development.





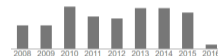
**Nadezhda M. Bulgakova** Follow

Institute of Thermophysics, Novosibirsk, Russia; HILASE Centre,  
Institute of Physics AS CR, Prague  
[Physics, Engineering](#)  
Verified email at itp.nsc.ru

Title	1-20	Cited by	Year
<a href="#">Pulsed laser ablation of solids: transition from normal vaporization to phase explosion</a>		312	2001
<small>NM Bulgakova, AV Bulgakov Applied Physics A: Materials Science &amp; Processing 73 (2), 199-208</small>			

Google Scholar

Citation indices	All	Since 2011
Citations	2683	1371
h-index	26	23
i10-index	43	32



- Key cited researcher in my PhD thesis (Applied Physics A, 2005).
- Pioneer physicist in the training to be performed within MSCA.
- Person with high ethics.
- Was expert for EU commission: knows how to write.
- Was Marie-Curie fellow: knows how it works.

## Key ingredients

- ✓ Ready for mobility, personal preparation.
- ✓ Aware of my dream topic since 2010: compute laser excitation of materials both classically and quantumly.
- ✓ Choice of supervisor: Prof. Nadezhda M. Bulgakova (support letter for Berlin, key theoretician)
- ✓ Choice of the main institution: Hilase, Prague (NMB was working there, new type of industry-oriented research).

# Choice of the secondment supervisor



**Angel Rubio**

Follow

Director Max Planck for the Structure and Dynamics of Matter, Hamburg and Professor of Physics UHH

Physics, Biophysics, Chemistry, Materials Science, Mathematical & Computational biology

Verified email at mpsd.mpg.de - [Homepage](#)

Title	1-20	Cited by	Year
<a href="#">Electronic excitations: density-functional versus many-body Green's-function approaches</a>		2386	2002
G Onida, L Reining, A Rubio Reviews of Modern Physics 74 (2), 601			

Google Scholar

Citation indices	All	Since 2012
Citations	42787	20424
h-index	104	70
i10-index	415	314



- Extraordinary CV.
- Total fit with the targeted training.
- Supported by ERC Advanced grants.
- Prestigious European institute: Theoretical spectroscopy leader at *Fritz Haber Institute* (FHI: 7 Nobel Prizes during 20th century).

## Key ingredients

- ✓ Ready for mobility, personal preparation.
- ✓ Aware of my dream topic since 2010: compute laser excitation of materials both classically and quantumly.
- ✓ Choice of supervisor: Nadezhda M. Bulgakova (support letter for Berlin, key theoretician in 3D Maxwell modeling in matter)
- ✓ Choice of the main institution: Hilase, Prague (NMB was working there, new type of industry-oriented research).
- ✓ Choice of secondment supervisor: Prof. Angel Rubio and Dr Heiko Appel in Fritz Haber Institute, Berlin.

<input type="checkbox"/>	Possible surface plasmon polariton excitation under femtosecond laser irradiation of silicon TJY Derrien, TE Itina, R Torres, T Sarnet, M Sentis Journal of Applied Physics 114, 083104	35	2013
<input type="checkbox"/>	Rippled area formed by surface plasmon polaritons upon femtosecond laser double-pulse irradiation of silicon TJY Derrien, J Krüger, TE Itina, S Höhm, A Rosenfeld, J Bonse Optics express 21 (24), 29643-29655	34	2013
<input type="checkbox"/>	Formation of femtosecond laser induced surface structures on silicon: Insights from numerical modeling and single pulse experiments TJY Derrien, R Torres, T Sarnet, M Sentis, TE Itina Applied Surface Science 258 (23), 9487-9490	19	2012
<input type="checkbox"/>	Rippled area formed by surface plasmon polaritons upon femtosecond laser double-pulse irradiation of silicon: the role of carrier generation and relaxation processes TJY Derrien, J Krüger, TE Itina, S Höhm, A Rosenfeld, J Bonse Applied Physics A 117 (1), 77-81	14	2014
<input type="checkbox"/>	Application of a two-temperature model for the investigation of the periodic structure formation on Si surface in femtosecond laser interaction TJY Derrien, T Sarnet, M Sentis, TE Itina Journal of Optoelectronics and Advanced Materials 12 (3), 610-615	13	2011
<input type="checkbox"/>	Plasmonic formation mechanism of periodic 100-nm-structures upon femtosecond laser irradiation of silicon in water TJY Derrien, R Koter, J Krüger, S Höhm, A Rosenfeld, J Bonse Journal of Applied Physics 116 (7), 074902	12	2014

- Most cited publications = 1st author publications.
- 29 years old while submitting project.

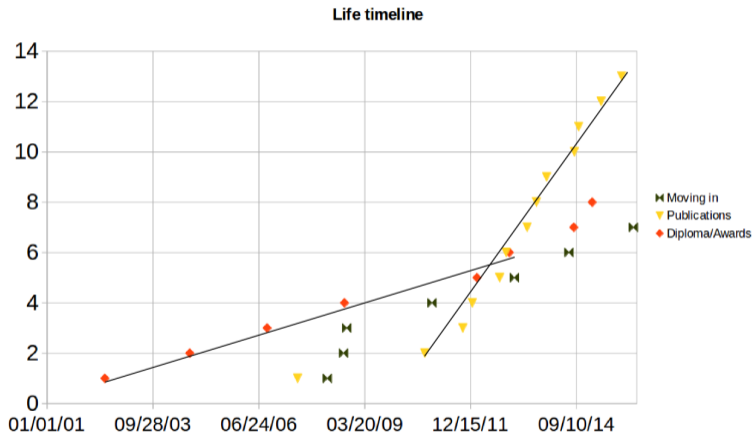
## Awards of applicants matter

15th Aug 2014 "Featured article" of *Journal of Applied Physics* for me with previous supervisor.

2nd Sept 2014 New supervisor had her 1st Nature Materials accepted for publication (IF ~ 35).

11th Sept 2014 MSCA deadline for submission.

# Lifeline

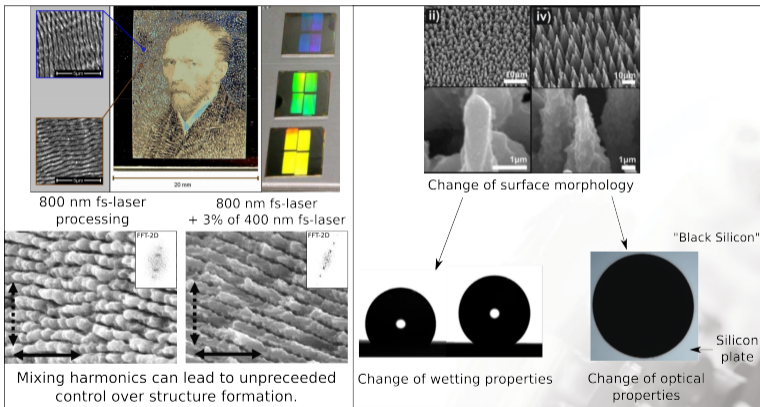


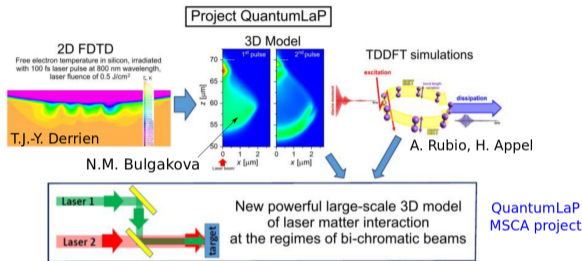
## Key ingredients

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- ✓ Aware of my dream topics since 2010: compute laser excitation of materials both classically and quantumly.
- ✓ Choice of supervisor: Nadezhda M. Bulgakova (support letter for Berlin, key theoretician in 3D Maxwell modeling in matter)
- ✓ Choice of the main institution: Hilase, Prague (NMB was working there, new type of industry-oriented research).
- ✓ Choice of secondment supervisor: Prof. Angel Rubio and Dr Heiko Appel in Fritz Haber Institute, Berlin.
- ✓ Demonstrated capacity of the applicant.



# Topic with high technological perspectives





**Fig. 2.** Project Quantum LaP, development of the theory of bi-chromatic laser interaction with matter. The figures are adapted from works by T.J.-Y. Derrien (left), N.M. Bulgakova<sup>15</sup> (middle), and H. Appel<sup>17</sup> (right).

## Hint

This scheme justifies a training by several people.  
Applicant will be highly trained by the grant.

## Missing ingredients

- ✓ Ready for mobility, personal preparation.
- ✓ Aware of my dream topics since 2010: compute laser excitation of materials both classically and quantumly.
- ✓ Choice of supervisor: Nadezhda M. Bulgakova (support letter for Berlin, key theoretician in 3D Maxwell modeling in matter)
- ✓ Choice of the main institution: Hilase, Prague (NMB was working there, new type of industry-oriented research).
- ✓ Choice of secondment supervisor: Prof. Angel Rubio and Dr Heiko Appel in Fritz Haber Institute, Berlin.
- ✓ Demonstrated capacity of the applicant.
- ✓ Topic with great fundamentals, high potential for real-world applications, even economical development.
- ? Deep scientific "convincing" novelty (not just repeating what was done by competitors).
- ? Writing so that anybody can understand.

Your main supervisor has a better vision than you! Ask his/her help.

## Topic definition

In my case, we have combined various needs:

- I wanted to **learn quantum calculations** for getting a permanent position.
- Supervisor also brought that **mixing laser wavelengths** brings **outstanding results for future applications**.

Then, I found out that **quantum simulations could calculate absorption probability** at high intensity.

## Organization of the collaboration

- Prof. and me prepared the proposal, and submitted regular drafts to Hamburg's group while writing.
- Secondment org. replied only 2 days before deadline.
- We also asked **corrections by a native speaker**.
- Whole writing process took 1 month.

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# Summary of Outcomes

## Outcomes of the MSCA grant QuantumLaP

**Publications** 5 published articles in international journals [Highest: Sci. Rep. IF 5.5].

**Patent** 1 patent in laser processing.

**Invited** 6 invited oral presentations in international conferences

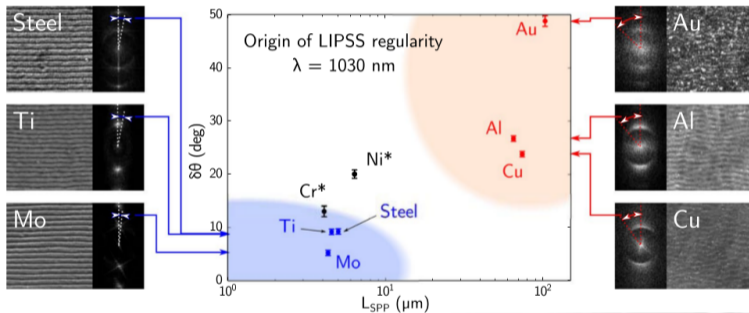
**Trainings** Attended 4 schools of physics (Heraeus plasmonics, SLIMS Venice, TDDFT Benasque, Nature Writing masterclass) + Adv. trainings on state-of-art quantum simulation techniques, computational optimization, big data, programming standards.

**Award** 1 "Roger Kelly" award in international school.

**Database** database of quantum predictions for many laser parameters. Quantum simulations with double-pulse and bi-color lasers are available. Publications under preparation.

**Network** Large increase of visibility: new collaborators (Jena Univ., CEA Paris-Saclay, Twente Univ., Alphanov company FR), new kinds of scientists met in Benasque school (TD-DFT) and Heraeus School (Plasmonics).

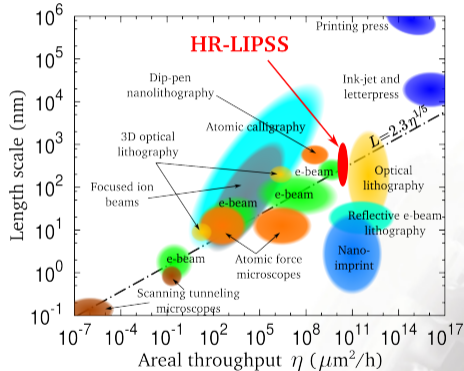
# Theory-enabled control on nanostructure formation



Gnilitskyi, I.; Derrien, T.; Levy, Y.; Bulgakova, N.; Mocek, T. & Orazi, L. Scientific reports, 7, 8485 (2017)

# Competitive process

Adapted from: Imboden, M. & Bishop, D. Top-down nanomanufacturing. *Physics Today* **67**, 45–50 (2014).






Patent in Czech Republic + European patent.

- Title: Method of ultrafast laser writing of highly-regular periodic structures on metallic materials
- Authors: Iaroslav Gnilitskyi, Leonardo Orazi, Thibault J.-Y. Derrien, Nadezhda M. Bulgakova, and Tomas Mocek
- Number: PCT/CZ2017/050027, PV 2016-424.
- Filing application date: 11th July 2016.
- Validated 16th of March 2017.

- Max Planck Institute of Structure and Dynamics of Matter (MPSD), Hamburg.
- Prof. Angel Rubio, Director of the MPSD.
- Theory group from March 2016, 1st for 6 months + regular visits.
- Training on a first-principle method of simulation: "TD-DFT" in solids



Octopus simulation code.



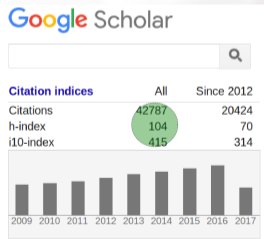
**Angel Rubio** Follow ▾

Director Max Planck for the Structure and Dynamics of Matter, Hamburg and Professor of Physics UHH

[Physics, Biophysics, Chemistry, Materials Science, Mathematical & Computational biology](#)

Verified email at [mpsd.mpg.de](mailto:mpsd.mpg.de) - [Homepage](#)

Title	Cited by	Year
<a href="#">Electronic excitations: density-functional versus many-body Green's-function approaches</a> G Onida, L Reining, A Rubio Reviews of Modern Physics 74 (2), 601	2386	2002





The screenshot shows a web browser displaying the profile of Dr. Thibault Derrien on the website of the Max Planck Institute for the Structure and Dynamics of Matter (mpsd). The page includes a navigation menu, a search bar, and a sidebar with a 'Theory Department' section. The main content area features a photo of Dr. Derrien, his title as a Postdoc, his email address, and his current address at the institute.

**Navigation:** Intranet | Contact | Sitemap | Deutsch

**Header:** Max Planck Institute for the Structure and Dynamics of Matter

**Menu:** INSTITUTE | RESEARCH | NEWS | IMPRS | CAREER

**Breadcrumbs:** Home > Research > Theory Department > People > Dr. Thibault Derrien

**Sidebar: Theory Department**

- People
- Publications
- Quantum Optics with X-Rays (Nina Rohringer)
- Theory of Correlated Systems out of Equilibrium (Martin Eckstein)

**Profile: DR. THIBAUT DERRIEN**

**Image:** 

**Dr. Thibault Derrien**

**Position:** Postdoc

**Email:**

- derrien@...

**Address:**

Max Planck Institute for the Structure and Dynamics of Matter  
 Dr. Thibault Derrien  
 Luruper Chaussee 149, Geb. 99 (CFEL)  
 22761 Hamburg  
 Hamburg  
 Germany

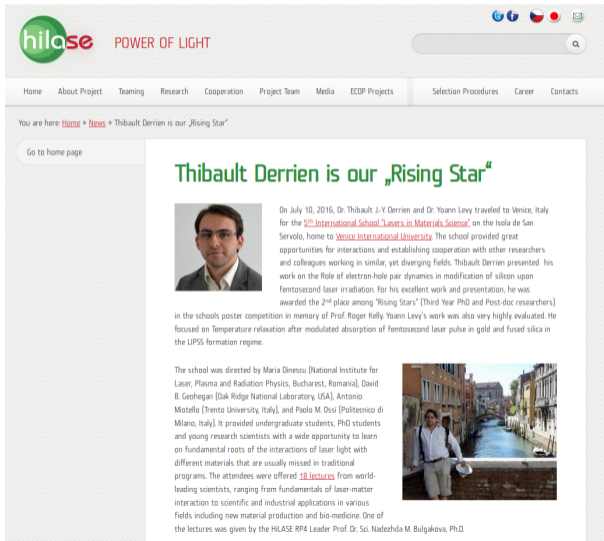
**Organizational Unit (Department, Group, Facility):**

- Theory Department
- Theory Group

## Trainings

- Deep understanding of the laser-matter interaction
- 3d visualization of laser-matter interaction at the quantum scale.
- TD-DFT can be efficient to predict quantity of excited electrons on wide range of parameters.

# Visibility



The screenshot shows the hilase website with the following elements:

- Header:** hilase POWER OF LIGHT logo and navigation icons (Facebook, Twitter, YouTube, LinkedIn, RSS, Email).
- Navigation Menu:** Home, About Project, Teaming, Research, Cooperation, Project Team, Media, ECDP Projects, Selection Procedures, Career, Contacts.
- Breadcrumbs:** You are here: [Home](#) » [News](#) » Thibault Derrien is our „Rising Star“
- Buttons:** Go to home page
- Section Header:** Thibault Derrien is our „Rising Star“
- Image:** A portrait of Thibault Derrien.
- Text:** On July 10, 2016, Dr. Thibault J.-Y. Derrien and Dr. Yoann Levy traveled to Venice, Italy for the 5th International School „Lasers in Materials Science“, on the Isola de San Servolo, home to Venice International University. The school provided great opportunities for interactions and establishing cooperation with other researchers and colleagues working in similar, yet diverging fields. Thibault Derrien presented his work on the Role of electron-hole pair dynamics in modification of silicon upon femtosecond laser irradiation. For his excellent work and presentation, he was awarded the 2nd place among „Rising Stars“ (Third Year PhD and Post-doc researchers) in the schools poster competition in memory of Prof. Roger Kelly. Yoann Levy's work was also very highly evaluated. He focused on Temperature relaxation after modulated absorption of femtosecond laser pulse in gold and fused silica in the LIPSS formation regime.
- Text:** The school was directed by Maria Dinescu (National Institute for Laser, Plasma and Radiation Physics, Bucharest, Romania), David B. Geohegan (Oak Ridge National Laboratory, USA), Antonio Motella (Trento University, Italy), and Paolo M. Ossi (Politecnico di Milano, Italy). It provided undergraduate students, PhD students and young research scientists with a wide opportunity to learn on fundamental roots of the interactions of laser light with different materials that are usually missed in traditional programs. The attendees were offered 18 lectures from world-leading scientists, ranging from fundamentals of laser-matter interaction to scientific and industrial applications in various fields including new material production and bio-medicine. One of the lectures was given by the HILASE RP4 Leader Prof. Dr. Sci. Nadezhda M. Bulgakova, Ph.D.
- Image:** A photo of a man standing by a canal in Venice.

**March 2016** Invited talk at the *Czech Chapter* of Marie Curie Alumni Association (MCAA), Brno.

**June 2016** Invited talk on Scientific Mobility, *French Embassy of Prague* (guest: Nobel Prize Laureate of Chemistry, JM Lehn).



**March 2019** Invited talk in Brussels, V4 Training for RISE

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**RISE** Research & Innovation Staff Exchange.

**ESR** Early Stage Researchers (~ master student, PhD student)

**ER** Experienced Researchers (permanents, post-docs)

## Main interest for the participants

- Network of esteemed collaborators
- Training the seconded researchers to share and merge their techniques.
- Being more competitive together. Transfer from competition → collaboration.
- To generate further, deeper, more relevant proposals in future.

# What can be funded by RISE?

		<b>"HOSTING"</b> (Receiving seconded staff members)		
		Academic organisation in <b>MS/AC</b> (1)	Non-academic organisation in <b>MS/AC</b> (2)	Organisation in <b>TC</b>
<b>"SENDING"</b> (seconding staff members <u>from</u> organisation)	Academic organisation in <b>MS/AC</b> (1)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Non-academic organisation in <b>MS/AC</b> (2)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Organisation in <b>TC</b> *	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

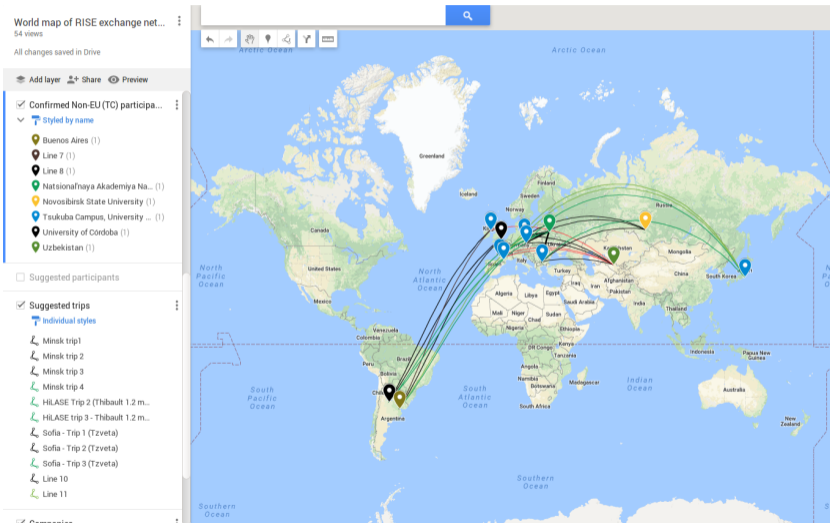
Yellow circles: our interests.

From the point of view of referees

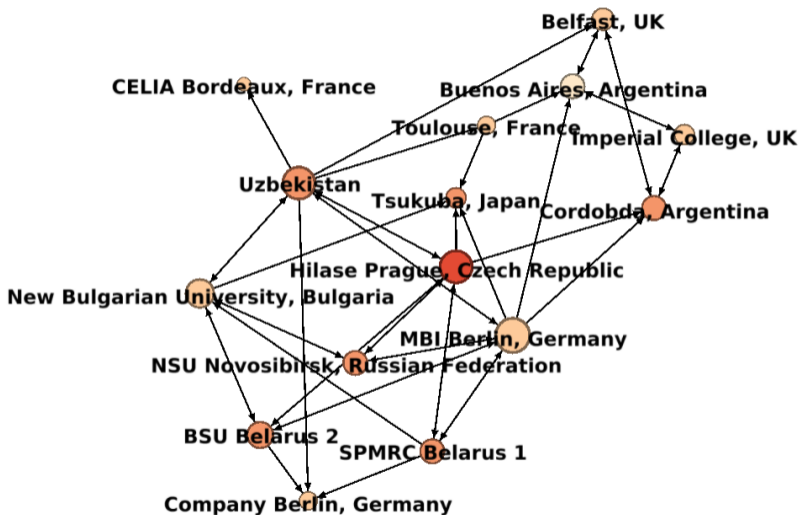
- Consortium should count few famous professors.
- Some smaller participants to LEARN / be trained by the big groups.

/! Conflict of interest → management committee.

# Secondment wishes



## Secondments

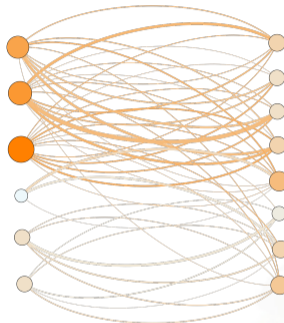


Prepared with Gephi (<https://gephi.org/>)

# ATLANTIC network



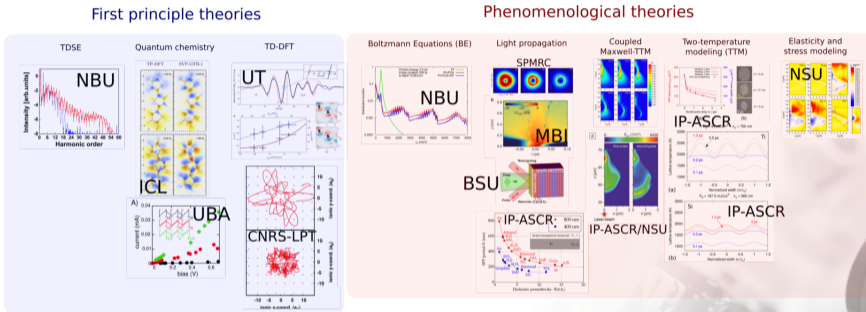
-  NBU, Bulgaria
-  IP-ASCR, Czechia
-  MBI, Germany
-  CNRS-LPT, FR
-  QUB, UK
-  ICL, UK



-  NSU, Russian Fed.
-  TSTU, Uzbekistan
-  BSU, Belarus
-  SPMRC, Belarus
-  UT, Japan
-  UNC, Argentina
-  UBA, Argentina
-  UNCuyo, Argentina

- 14 institutions
- ~40 researchers
- 4 years travelling budget (~825,000 €), ~200 PM.

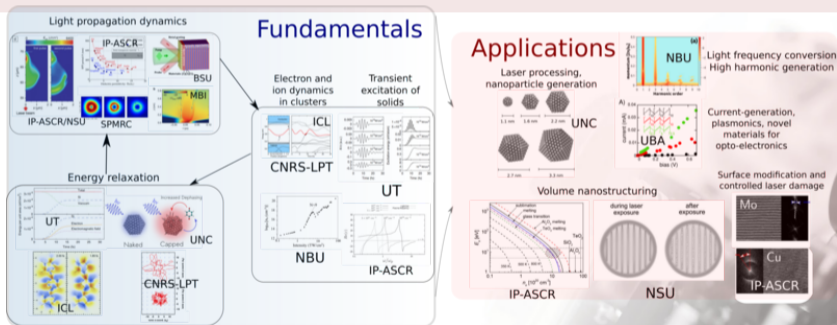
<http://www.atlantic-rise.eu/>



**Fig 2.** List of theoretical descriptions for laser-matter interaction that are available within the ATLANTIC project consortium, gathering members who pioneered these simulation techniques.

## Motivations

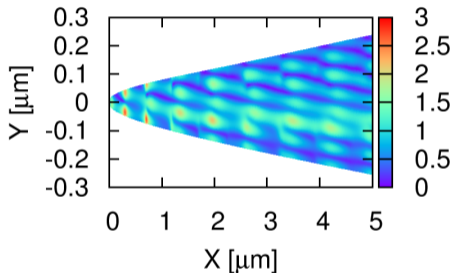
- EU H2020 > Progress (economical → social) > Applications-driven.
- Researchers > Progress (social, and freedom) > Curiosity-driven.



**Fig. 3.** Bringing the prediction capacities of first-principle theories to the macro-scale for developing real-world applications.



## Predictive "large-scale" simulations



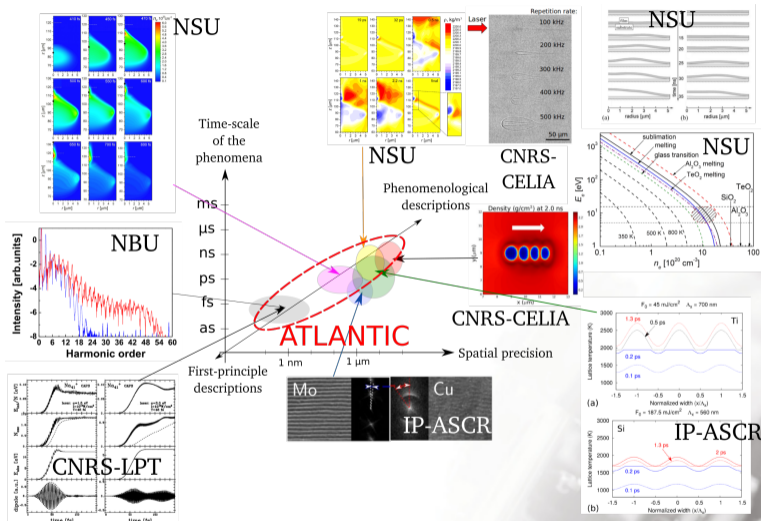
- Take into account the geometry and complexity of materials.
- Observe the macroscopic transport of charges: realize opto-electronic components.
- Describe real-size experiments: laser irradiated microstructures, etc.

Output: simulation codes

2D/3D continuum code : light propagation, matter excitation, and feedback.

Check <http://www.QuantumLaP.eu/>

# How can they work together?



**Fig. 1.** Timescales and spatial scales of the phenomena induced by pulsed laser excitation of solids and clusters. Acronyms indicate the activities of the different partners of the project. Figure was prepared from the available publications of the consortium. Red dashed ellipse shows the purpose of this RISE proposal: bridging different scales of modeling.

## Secure relations with partners

### Reality

Several partners are joining to rob ideas.

### Require Non-Disclosure Agreement from the beginning

Hope: robbers should then leave automatically.

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## RISE funding in practice

**”Top-up”** 2100 € per person-month to fund the trip (**not a second salary**).

**RTN** 1800 € for research training and networking: completes the trip support, and pays conference | workshop.

**Management** 800 € per person-month. For the EU beneficiaries.

**Scheme** € → coordinator → EU beneficiaries → non-EU partners.

**Question** Can RTN / management costs be used for inviting non-EU poorly-funded partners?  
NO ! :-)

## Management costs retained

**Typical** 25-50% of the management costs of each participant is kept by the coordinator.

**Services** Examples: coordinator supports Management Board meetings, performing the Periodic reporting...

### Good practice

Detail in the *Consortium Agreement* which services coordinator provides for this money.

## Timeline of the "ATLANTIC" project

- March 2019** Kick-off meeting
- April 2019** 1 beneficiary leaves the project ("safety reasons", French defense headquarters decision)
- Jan. 2020** First period report.
- March 2020** COVID blocks all travels for 2 years.
- Nov. 2020** Mid-term meeting with EU officer
- Apr. 2021** Mid-term report (LONG!)
- June 2021** Belarus closes boundaries to its citizens. Exchanges with a great partner: blocked.
- March 2022** War of Russia in Ukrain. EU enforces removal of Belarus & Russia from project, and require some funds back.
- Feb. 2024** End of project (currently attempting prolongation #2).

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Left to right: assoc. prof. Mitsuharu Uemoto, Dr. Atsushi Yamada, Dr. T. Derrien, assoc. prof. T. Apostolova, prof. Kazuhiro Yabana.



Traditional dinner in Nara region, with *QuantumLEAP* project.



Conference organized in Nara by prof. Yabana's group



Tour with Prof. Yabana in Kyoto

## Visit from partners



Prague, Sept. 2019: French, Bulgaria,  
Russia, Belarus + locals



Prague, Feb. 2020: Belarus + locals at  
Statni opera, Prague

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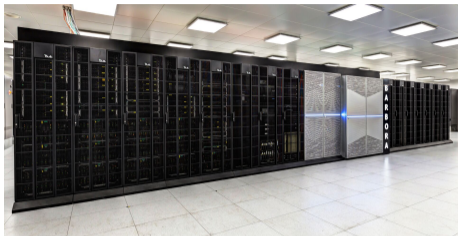
## Outstanding points

- Access key knowledge enabling new possibilities and saving time.
- Developed network worldwide (Russia, Japan, South America, EU).
- Development of wider geopolitical / diplomatic / ethical consciousness.
- A richer scientific life.

## More difficult aspects

- Project blocked by COVID (Argentina, Russia, Japan, ...).
- Project blocked by geopolitical situation (Belarus, Russia).
- Difficulties in realization of tasks (isolation relative to COVID).

# Running simulations using supercomputers from Top500



"Salomon" and "Barbora", Ostrava, Czech Republic

Prometheus, Krakow, Poland.



Karolina, Ostrava, Czech Republic.

## Optics EXPRESS

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### Welcomes Our New Associate Editors!



*Philippe Ben-Abdallah*  
*Institut d'Optique Graduate School, France*



*Pablo Bianucci*  
*Concordia University, Canada*



*Thibault Derrien*  
*Institute of Physics (FZU), Academy of Science  
of the Czech Republic, Czech Republic*



*Johan Nilsson*  
*University of Southampton, UK*



*Clara Saraceno*  
*Ruhr University Bochum, Germany*

Since 23 Oct. 2019.

## 2021: Group leader in "Ultrafast Photonics"

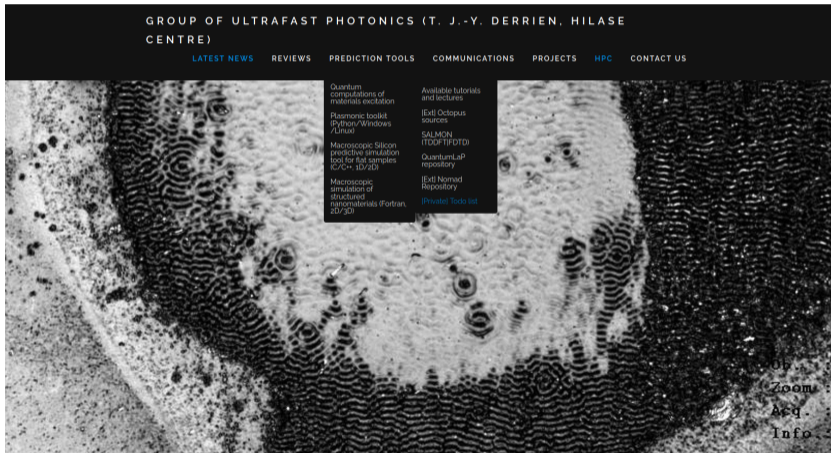


- Sept. 2017: PhD candidate Krystof HLINOMAZ (Czech R.)
- Aug. 2021: PhD candidate Kristyna GAZDOVA (Czech R.)
- May-June 2023 - Nov.-Dec 2023: PhD candidate Andrés I. BERTONI (Argentina)
- Dec. 2023 - Jan. 2024: PhD candidate Micaela J. SOSA (Argentina)



# Website of my group "Ultrafast Photonics"

<http://www.quantumlap.eu/>



GROUP OF ULTRAFAST PHOTONICS (T. J.-Y. DERRIEN, HILASE CENTRE)

LATEST NEWS   REVIEWS   PREDICTION TOOLS   COMMUNICATIONS   PROJECTS   HPC   CONTACT US

Quantum computations of materials excitation

Plasmonic toolkit (Python/Windows/Linux)

Macroscopic Silicon predictive simulation tool for flat samples (C/C++, 2D/3D)

Macroscopic simulation of structured nanomaterials (Fortran, 2D/3D)

Available tutorials and lectures

[Ext] Octopus sources

SALMON (TDDFT/FDTD)

QuantumLap repository

[Ext] Nomad Repository

[Private] Todo list

Up  
Zoom  
Acq  
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# Acknowledgments



MAX-PLANCK-GESELLSCHAFT

<derrien@  
fzu.cz>

- 2019-2024** This project has received funding from the European Union's Horizon 2020 research and innovation programme under the **Marie Skłodowska-Curie** grant agreement No 823897. Project "ATLANTIC" (2019-2023).
- 2017-2023** **European Regional Development Fund** and the **state budget of the Czech Republic** (project **BIATRI**: CZ.02.1.01/0.0/0.0/15\_003/0000445, **project HiLASE CoE**: No. CZ.02.1.010.00.015 0060000674, programme NPU I: project No. LO1602).
- 2018** **European Research Council** (ERC-2015-AdG-694097), Grupos Consolidados (IT578-13), and European Union's H2020 program under GA no.676580 (NOMAD).
- 2015-2017** European Union's Horizon 2020 research and innovation programme under the **Marie Skłodowska-Curie Actions Individual Fellowship** grant agreement No 657424. Project "QuantumLaP" (2015-2017)



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Development and Education



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