IMT–Académie des Sciences Awards

The 2023 awards go to Jacques Besson and Julien Tierny

The IMT–Académie des Sciences Awards recognizes the merits of leading scientists who have made exceptional contributions to their fields. These awards related to Institut Mines-Télécom's strategic themes – responsible industry of the future, digital sovereignty and sobriety, energy, circular economy and society, engineering for health and well-being – honor researchers who have made several recognized scientific advances or a major innovation. The 2023 awards showcased research on materials, essential building blocks for ecological and industrial transition and topological data analysis, a relatively new field in computer science.

With support from Fondation Mines-Télécom, the IMT-Académie des Sciences Award recognizes a scientist who has helped to advance issues pertaining to the industrial world or business, which promotes a sustainable economy in one of the following scientific and technological fields:
• responsible industry of the future;
• digital sovereignty and sobriety;
• energy, circular economy and society;
• engineering for health and well-being.

IMT–Académie des Sciences Grand Prix: **Jacques Besson, CNRS Research Director at the Materials Center (CDM – CNRS/Mines Paris – PSL)**

The Grand Prix (€30,000 grant) rewards a scientist who has made an exceptional contribution to one of the scientific or technological fields covered by the award through a set of recognized scientific advances that have enabled progress on issues related to the industrial or business world, while also promoting a sustainable economy.

After completing his postdoctorate in the United States, Jacques Besson turned his attention to the fracture mechanisms of metals. After graduating from Ecole Nationale Supérieure des Mines in Paris in 1992, he joined the CNRS where he conducted research in close collaboration with industry. In 2012, he took over as Director of Centre des Matériaux – a research unit of CNRS and Mines – PSL – where he still works as Deputy Director. He had two secondment experiences during his research career at CNRS: at the Hereon research Institute (ex-GKSS) in Germany in 2000 and at EDF Lab Les Renardières in 2005.

His research focuses primarily on the fracture of metallic materials such as steels, aluminum alloys, zirconium and titanium. His work combines experiments, models and simulations. It aims to increase the sustainability and safety of industrial facilities, with applications in transport, production and the use of energy. His desire to implement the models developed and carry out the simulations led him to begin reformulating a Zébulon/Zset calculation code in the early 1990s, which he co-developed with ONERA beginning in 1996. Combined with Zebfront software, this code has been used to support research, in particular for prototyping material behavior laws.

The numerous industrial partnerships which the researcher is involved in testify to the vast field of applications for his research: from nuclear energy with EDF, CEA and Framatome, to gas transport with GRTgaz, aeronautics with SAFRAN and ONERA, and the automotive industry with PSA. Since 2020, Jacques Besson has been the holder of an industrial chair funded by ANR: "Mini-samples for the in-service monitoring of Industrial structures and application to hydrogen transportation (MESSIAH)". As part of the decarbonization of energy sources, hydrogen produced by electrolysis of water from renewable sources of electricity or through dedicated nuclear reactors will play an important role as an energy carrier. There are therefore plans to collect and distribute the hydrogen produced using existing gas networks. Hydrogen tends to penetrate steels and weaken them. It is therefore crucial to characterize the suitability of the different sections of the distribution network for the transport of gaseous hydrogen

His career has also been marked by frequent publications – nearly 170 articles in international journals – and the supervision of over 70 theses. His work has been recognized by his peers and brought him international acclaim. The quality of his research has also been praised by the Péchiney Prize of the Académie des Sciences in 2002, which granted him the honored title of Fellow of the European Structural Integrity Society (ESIS) in 2018.

Jacques Besson, winner of the IMT-Académie des Sciences Grand Prix: "*I would like to express my gratitude to Institut Mines-Télécom and the Académie des Sciences for this prestigious award, which recognizes work on the safety and durability of materials and structures. I would like to include my colleagues, PhD students and industry partners in this recognition. This award recognizes the role our engineering schools play in solving the major technological challenges of the contemporary world, especially for the energy transition.*"

Learn more (Creative Commons): **https://imtech.imt.fr/2023/11/21/jacques-besson-grand-prix-imt-academie-des-sciences**
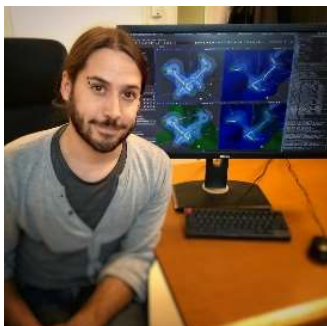
Young Scientist Award: Julien Tierny, CNRS Research Director at LIP6 (CNRS/Sorbonne University)

The Young Scientist Award (€15,000 grant) is bestowed on a scientist who is under 40 years of age on the first of January of the year of award of the prize (this limit can be extended for parents, by one year per child) who has contributed to one of the scientific or technological fields covered by the award through a major innovation that has advanced issues related to the industrial or business world, while also promoting a sustainable economy.

Julien Tierny's research overlaps the fields of computer science and applied mathematics by proposing to analyze the structure and topology of complex data with specific algorithms. This engineer from IMT Nord-Europe (Telecom Lille at the time), valedictorian of his graduating class, was interested in data visualization very early on. His key results are based on calculation and statistical analysis.

After spending four years at the LTCI laboratory of Telecom Paris, Julien Tierny joined the LIP6 laboratory (CNRS/Sorbonne University) in 2014 at the Sorbonne University site, where he now works as CNRS research director.

He designs algorithms based on topology concepts and applies them to the fields of data visualization and interactive data analysis, particularly from scientific imagery (acquired or simulated data). His algorithms enable the robust and efficient extraction of hidden structural patterns within complex data, thus revealing the data's true substance. This method is of particular interest to industry because it can be applied, for example, to large amounts of simulation data (e.g., physical, mechanical processes). He works in cooperation with several industrial stakeholders in various fields such as chemistry, energy and astrophysics. In 2019, he was awarded a five-year ERC Consolidator grant for his work. This project has allowed him to recruit and supervise his current team of about ten people.

The topological algorithms will be applied to the next generation of supercomputers.

Julien Tierny is also the main developer of TTK, an open-source library. This library, initially created to facilitate the research work of his PhD students, now showcases the team's work and facilitates the development of new collaborations.

Finally, he has been recognized year after year for the quality of his publications by being awarded several "Best Paper Awards" at various conferences. He has been – and still is – on the steering or program committees of several IEEE international conferences and workshops and is also a peer reviewer for numerous journals in his field.

Julien Tierny, winner of the IMT–Académie des Sciences Young Scientist Award: "*I am very honored to receive this award. I would like to thank Institut Mines-Télécom and the Académie des Sciences for highlighting my research on topological data analysis, at the interface between computer science, mathematics and fields of application. Many thanks to my staff, and especially the PhD students who I have had the privilege of working with, who are a constant source of vitality and enthusiasm. Finally, I would like to thank all my teachers, from primary school to higher education, who taught me the value of hard work and scientific curiosity*."

Learn more (Creative Commons):

https://imtech.imt.fr/2023/11/20/julien-tierny-prix-espoir-imt-academie-des-sciences

About Institut Mines-Télécom www.imt.fr/en

Institut Mines-Télécom is the leading public group of French engineering and management schools to be placed under the supervisory authority of the Ministry of the Economy, Finances and Industrial and Digital Sovereignty. It is a public research and higher education institution made up of eight public graduate schools: IMT Atlantique, IMT Mines Albi, IMT Mines Alès, IMT Nord Europe, Institut Mines-Télécom Business School, Mines Saint-Étienne, Telecom Paris and Telecom SudParis as well as two subsidiary schools: EURECOM and InSIC. It leads and develops a rich ecosystem of partner schools and economic, academic and institutional partners and players in training, research and economic development. Created to meet France's needs in economic and industrial development since the 19th century, Institut Mines Télécom's graduate schools have supported all the communications and industrial revolutions. Through its research and its training of engineers, managers and PhD students, Institut Mines-Télécom tackles the major industrial, digital, energy and environmental challenges in France, Europe and around the world. Today, Institut Mines-Télécom and its 10 schools are imagining and building a world that

combines science, technology and economic development with a respect for the planet and the people who live on it. It is double Carnot certified and trains 13,600 students every year.

Press contact Institut Mines-Télécom :
Séverine Picault
06 27 66 05 09 / severine.picault@imt.fr