

La gazette du GT MG

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Le GT change de co-responsable : à partir de Janvier 2027 Céline Roudet (LIB, Université Bourgogne Europe) devient co-responsable avec Samuel Peltier. Céline est élue à l'unanimité lors de l'AG du GTMG à Geometry & Computing, le 8 Octobre 2026. Julie Digne ne part pas très loin car elle s'occupera avec Marc Christie (IRISA) du gdr IG-RV, un des deux GDRs auquel émarge le GTMG. Les prochaines journées du GT auront lieu les ***17 et 18 mars 2027 à Lyon****. À très bientôt,*

Céline, Samuel & Julie

Informations rapides

- Mobilité des GDR : les deux GDR IG-RV et IFM proposent des périodes de mobilités de jeunes chercheurs, d'un laboratoire à l'autre, surveillez les annonces, n'hésitez pas à candidater.
- MyGDR : n'oubliez pas de vous inscrire sur la plateforme et de faire inscrire vos collègues : https://mygdr.hosted.lip6.fr/. Merci de maintenir vos informations à jour.

Retours

La conférence « Geometry & Computing » a eu lieu au CIRM du 5 au 9 Octobre 2026. Les 3 GTs de Géométrie (GeoAlgo, GDMM, MG) s'y sont retrouvés. La conférence était organisée par Jacques-Olivier Lachaud et Matthieu Desbrun. Une demi-journée était organisée où les 3 GTs ont pu tenir des mini-journées. Côté GT MG, nous avions un exposé de Hakim Ferrier-Belhaouri (XLIM, Poitiers) intitulé « Applications of Formal Methods Techniques in Topology-Based Geometric Modeling : Graph Transformations and Constraint Satisfaction for Solving Geometric » ; un exposé de Enzo Harquin (LIGM, Paris) « From Higher-Dimensional Cross-Ratios to Homographies in PGA » ; et un exposé de Dmitry Sokolov (LORIA, Nancy) « Locally Injective Deformations and Distorsion Control ».

Nous avions également organisé une table ronde pour parler de l'impact de l'IA sur la recherche en Géometrie avec comme invités Géraldine Morin (IRIT, Toulouse), Jean Feydy (HeKA, INRIA Paris) et Rocío González Díaz (CIMA Group, Seville). La discussion a été riche et a donné à réfléchir. Un compte rendu du débat se trouve en fin de gazette.

Rendez-vous

- Les prochaines Journées Françaises d'Informatique Graphique (jFIG) se tiendront à Toulouse du 3 au 6 novembre 2026, https://www.irit.fr/jFIG2026.
- Les prochaines Journées du GT MG auront lieu à Lyon les 17 et 18 Mars 2027, https://gtmg2027.sciencesconf.org/.

Soutenances

- Mattéo Clémot a soutenu sa thèse le 16 Octobre 2026 à 14h à Lyon : *Calcul accéléré de descripteurs topologiques pour l'analyse de nuages de points – Accelerated computation of topological descriptors for point cloud analysis.*
- Vincent Commin soutient sa thèse le 07 décembre 2026 à Poitiers à 14h : *Reconstruction automatique de systèmes*

horlogers anciens.

Arrivants

— Corentin Salaün rejoint l'équipe Origami du LIRIS en tant que Maître de Conférences. Ses recherches portent sur le rendu physique en temps réel, avec un intérêt particulier pour l'échantillonnage, la modélisation perceptuelle et la reconstruction efficace d'images. Il s'intéresse surtout à la manière dont la perception visuelle humaine peut être intégrée dans les algorithmes de rendu pour améliorer la qualité et l'efficacité des graphismes en temps réel. Ses travaux explorent également les techniques de débruitage et de reconstruction en temps réel pour les images bruitées générées par des méthodes de Monte Carlo, dans le but de produire des images de haute qualité sous des contraintes computationnelles strictes.

— Meghna P. Ayyar a récemment rejoint l'équipe REVA à Toulouse INP / ENSEEIHT. Son expertise réside dans l'IA pour le multimédia, avec un accent particulier sur l'intelligence artificielle incrémentale et explicable pour les données multimodales. Après sa thèse à l'Université de Bordeaux, ses recherches actuelles explorent notamment les modèles vision-langage, l'apprentissage continu en flux en ligne et l'adaptation efficace à l'inférence. Ses travaux visent à développer des modèles robustes, interprétables et adaptables pour des applications visuelles complexes, à l'intersection de la modélisation géométrique et du deep learning.

— Thèse : Killian Rando, sur le programme France 2030 EDT Engineering Digital Twin, « Construction automatique d'une maquette numérique issue de scène réelle : extraction de la géométrie, de la cinématique et des propriétés mécaniques basée sur l'apprentissage », Romain Raffin, Sandrine Lanquetin (LIB) et Gilles Rougeron, Jérémie Le Garrec (CEA LIST).

— Thèse : Tom Boireau, « Caractérisation topologique et sémantique de nuages de points en mouvements pour l'apprentissage des gestes techniques », Samuel Peltier, Wassim Rharbaoui (XLIM Poitiers).

Articles de la communauté

— *Estimating the Persistent Homology of $\mathbb{R}^n$-valued Functions Using Function-Geometric Multifiltrations*, Steve Oudot with Ethan André, Jingyi Li, David Loiseaux.

— *The sublevel Flood bifiltration : towards scalable 2-parameter persistent homology*, Mattéo Clémot, Julie Digne, Julien Tierny, NeurIPS 2026.

— *SeeSE3 : The Emergence of 3D Space in Vision Features* Caroline Chen, Sayna Ebrahimi, Fedor Kitashov, Ming-Hsuan Yang, Leonidas Guibas and Viorica Pătrăucean, Maks Ovsjanikov, NeurIPS 2026

— *Spectral Geometry of Attention : From Information Routing to Uncertainty*, Giulio Viganò, Simone Melzi, Maks Ovsjanikov, NeurIPS 2026.

— - I. Diarra, F. Beguet, S. Lanquetin and R. Raffin, « Graph Pattern Matching based reassembly - 3DGPM, » in IEEE Computer Graphics and Applications, doi : 10.1109/MCG.2026.3707751

— Jiong Chen, Mathieu Desbrun with Weizhou Liu, Xingyu Ni, *Neural Field Processing on Surfaces* SIGGRAPH Asia 2026 conference track.

— *OffsetAxis : UDF Mesh Reconstruction via Offset-Volume Medial Axis Extraction*, Qijia Huang, Pierre Kraemer, Dominique Bechmann, Siggraph Asia 2026 conference track. https ://huang46u.github.io/OffsetAxis-Page/

Success stories

— Best Paper Award at SIGGRAPH Asia 2026 « Efficient Open-Boundary Poisson Solves » for XINGYU NI, JIONG CHEN, MATHIEU DESBRUN et al.

Compte Rendu de la table ronde *Impact of Machine Learning on Geometry*

Research

Compte Rendu par Romain Raffin

La table ronde a été suivie par une assistance nombreuse (manque de places, personnes debout) et les interactions avec l'assemblée ont été riches. Vous trouverez le compte-rendu complet de ce moment, en anglais, ci-dessous. En résumé très rapide : l'utilisation de l'IA s'impose dans tous les domaines, cela couvre la recherche bibliographique, la synthèse de documents, la recherche d'idées ou des expérimentations rapides, le développement et la relecture d'articles pour publication. La question du biais et de la confidentialité se posent, des universités ont imposé l'usage d'IA locales ou nationales (université de Rennes) mais la compétitivité des chercheurs peut être limitée par rapport aux scientifiques ayant des accès complets à des modèles plus grands. Cette pression faite par l'IA a été mise en avant par tous les intervenants, comme une course en avant où l'IA peut générer plus de pression et de stress que de résultats scientifiques de premier plan. Cette interrogation est prégnante pour les doctorants qui se sentent écrasés par l'immédiateté et la sensation d'être dépassés. Les éditeurs et organisateurs de conférences sont également soumis à des flux grandissant de façon exponentielle des quantités d'articles par auteur, par équipe ou par laboratoire, raisonnablement impossible à rédiger/réfléchir rapidement. Ces flux sont autant d'articles à relire et évaluer, et le processus boucle sur l'analyse par l'IA des propositions de publications.

La table ronde termine par des interrogations sur le rôle philosophique, sociétal encore possibles pour les scientifiques.

Panelists : Géraldine Morin (IRIT, Toulouse) - **GM**, Jean Feydy (HeKA, INRIA Paris) - **JF**, Rocío González Díaz (CIMA Group, Seville) - **RGD**.

Panel moderators : Julie Digne - **JD** and Samuel Peltier - **SP** & **A** (audience)

Compte rendu par Romain Raffin.

Rocío González-Díaz is a Full Professor of Applied Mathematics at the University of Seville, Spain, where she leads the CIMAgroup research team. Her research sits at the intersection of computational topology, data analysis, and more recently artificial intelligence, with a particular focus on developing topological and computational methods to understand complex data. Her recent work explores how these approaches can contribute to more efficient, interpretable, and trustworthy AI.

Géraldine Morin is Full Professor at Toulouse INP, member of the IRIT research institute in Toulouse, France, where she leads the REVA research team. Her research lies at the intersection of geometric modeling, computer graphics, and multimedia, focusing on the representation, generation, and analysis of 3D content. Her work includes skeleton-based representations for geometric modeling and shape analysis, as well as recent research on 3D Gaussian Splatting and efficient, scalable representations of complex 3D scenes.

Jean Feydy is an INRIA Researcher (HeKA team), hosted at PariSanté Campus in Paris, France. His research lies at the intersection of geometry, data science, and machine learning, with a particular focus on optimal transport, geometric data analysis, and geometric deep learning. He is a developer of KeOps and GeomLoss, two open-source libraries for efficient large-scale geometric computation and optimal transport. His work develops computational methods for analyzing and comparing complex geometric data, with applications including shape analysis and medical imaging.

SP : Did you change your research topics since AI arose ?

GM : new rules in Toulouse university, how to use/detect/« control » AI production, avoid US-made models (blocked by University), RAG from Rennes Université (but less competitive). It is now necessary for all topics but it must be well understood. (Toulouse University also avoids github)

RGD : We will be less competitive if we do not use it.

JF : My research is focused on geometric statistics and medical image registration. Since the publication of UNets at MICCAI in 2015, the field has been very influenced by machine learning research. This has allowed me to observe the many hidden costs of these technologies, which tend to be brushed under the carpet in the literature but pose significant problems in practice. For instance, getting legal access to medical data is extremely time-consuming, and annotating it

can be prohibitively costly, even for major companies. The randomness of the algorithms involved also introduces a lot of complexity. In this context, I made a deliberate effort to prioritize simple, affordable methods.

RGD : My research is focused on computational topology and now explicable AI. I improve a method using topology. Topology is good to analyze how the learning works.

GM : AI definitely helps getting some semantic interpretation for image or 3D.

JD : What about AI-related tools development to accelerate scientific methods ?

JF : People think that by using pytorch or ready-to-play models, they are up to date, using state-of-the-art tools. Difficulties arise when a user wants to develop extensions, specific processing. It is hard to be innovative if focused on the same tools/research path as everybody.

JD : Do LLM impact your way of doing research ?

RGD : LLMs are very good, the system forces students and researchers to use LLM - It can be seen on the number of submitted papers. How can we evaluate the quality not the quantity ? It can be a problem for researcher promotion and PhD evaluation. The number of grant applications also rose, due to the systematic use of LLM. Each of them looking very good, and it is very difficult to sort them (more time to evaluate).

JD : some journals/conferences limit the number of submissions to 1 for first time submitters, and to 20 for a single person.

JF : Institutions that do not move away from naive publication metrics will quickly lose their reputation. This is a difficult problem to solve, because « objective, open, fair » evaluation metrics always end up being gamed. On the other hand, more opaque, higher-dimensional selection criteria can quickly lead to cartel-like behavior if recruiting panels are not monitored closely. A thought-provoking result from the field of differential privacy is that a deterministic statistical estimator will always leak information about its dataset. As a consequence, privacy-preserving methods should, necessarily, be partially random in order to provide « plausible deniability » to study participants. We may have to accept similar compromises.

A : Look at researchers in China, always adapting to governemental evaluation rules, to maximize their score.

GM : Submitting to journal is a long process, not always compatible with the fast pace at which a field evolves nowadays.

A : The pressure involved by ML is to accelerate scientific reflexion, pair validation, next paper planning. There is an implicit penalty for people that do not use AI, or simply take the time for reflecting on the right research path.

A : we loose a lot of research paths, maybe machine learning limits the creativity in scientific fields.

JF : to do good science, you need to move freely, in a creative environment. In a industrial environment, the need of AI is more pregnant. In Computer Science we do a lot of applications focused researchs, closer to industrial needs.

RGD : I received a paper written by colleagues using AI tools. The authors wanted to know if this was correct. I found a mistake returned it back to the authors, new version written by AI ... A never-ending loop. It gives more work to the reviewers, and if the paper looks convincing it can be published, without a rigorous check due to lack of time. Example : LEAN proofing system becomes the reference. We believe in LEAN results.

A : AI has used a LEAN kernel bug to prove false theorems, Lean and Rock kernels are not verified.

GM : Ablation studies are required to « prove by example » but they do not prove the theorical solution.

JF : At the end of the day, time spent talking to an LLM is time that is not spent talking to someone else. In my field, I feel that the most precious information is not written online to be scrapped by a model, but contained in the day-to-day experience of nurses, technicians and medical doctors. As a consequence, I prioritize in-person exchanges. As an academic, I also think that my duty is to have an original opinion, inject some variance in the system. From this perspective, getting advice from the same LLM as everyone else would not really help.

JD : LLM can be tweaked to change past scientific results or rewrite science history. This is done by governments to rewrite political history or hide some historical facts (e.g. China).

JF : Currently, LLM are better than Google Scholar. Asking an LLM is seen by some people as better than talking to a colleague - this feels very dangerous to me. There is a sort of addiction to always using AI, improving prompt to compete with LLM and themselves. Students and researchers can burn themselves in this rush.

JD : Are you concerned about the environmental impact and sustainability of such uses ?

GM : Thereis a lot of discussions on this subject. There is an evil loop between high-level equipment and innovative AI based projects.

A : a parallel can be made with TV, initially great for dissemination and culture.

RGD : a false free investissement, the cost will be visible by users someday.

A : the investments in such systems will not be endless.

SP : Are there ethical rules in your institution to mention your use of LLM ?

RGD : it is used by everyone, people don't mention it.

A : it is a progress, all papers have nice illustrations and the scientific content is understandable.

RGD : The key is to use AI responsably.

A : In a lot proposals, we have switched from « funding for students » requests to « funding for tokens » requests. Even for ANR applications.

JD : Any fears of data theft ? Ideas ? (As was probably the case for the Navier-Stokes breakthrough).

GM : AI for transcripting meeting, good for students, but the discussion is added to the dataset of an LLM.

JF : What about the contents, the data that could be sensitive, and diffused, reused, analysed by AI or agents. When scandals about massive data leaks will emerge, domain experts (say, medical doctors) will be able to plead for forgiveness - but as computer scientists, supposedly well aware of security risks, we will be held accountable.

RGD : In our research, we have no more protection than in our everyday life, we often give complete access to everything.

JD : We can not be surely contained in a virtual environment. We saw examples of AI hacking its way outside of a container.

JD : How do you see the future of (y)our research ?

RGD : a lot of conjectures proposed recently by openAI, very difficult for the human to find counter-examples, this is where AI particularly excels.

JF : Since the current environment feels extremely volatile and unsustainable, I don't want to make predictions - but it's clear that many things will change. This is accepted in radiology, where the job changes radically at every generation due to a lot of technological revolutions (MRI, PET-scans, ...). In mathematics, the ecosystem had been stable for decades but now AI is changing everything. It is certainly the most significant change since the discovery of calculus or the invention of the calculator.

A : What would happen if (or when) AI is better than our research ? Many PhD students are questioning their career choices, and think whether they would not be happier with « manual works ». It is also a reflexion on what makes us human.

JD : AI is more efficient, 24/7 active, no constraints.

A : we can not discuss about the limits, as we can not prevent them.

A : AI still needs human approvement and validation. Human can refuse AI-made scientific proposal. What is important is what we propose as a counter-narrative against AI-fatalism. If we open the general public's eyes on power usage, water could we find a better path ?

A : AI reinforces isolation of humans, querying AI first.

A : The benefit is for the AI company, it is driven by maximizing the usage and keeping people querying.

JD : We can not completely ignore the AI produced results though, if they improve science.

JF : Mathematicians are like mountain guides : ultimately, society expects us to provide a deep, transformative experience to engineering students. Our most important contribution was never about reaching new summits, but about sharing what was already known. One of the problem that the community is facing is that we used to assess mathematical « fitness » via the resolution of conjectures and open problems - but just like the conquest of Mt. Everest, this is likely to become irrelevant now that « helicopters » do exist. Physicists faced similar questions about credit attribution with the advent of big shared experiments such as the LHC - we could probably learn from them.

Contacts

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Les correspondant.e.s de chaque équipe seront sollicité.e.s avant la prochaine parution, mais vous pouvez devancer l'appel en nous faisant parvenir toutes vos nouvelles concernant la modélisation géométrique ! Si vous voulez diffuser vos informations dans la gazette, n'hésitez pas ;-)

Site web du GT : https://gtmg.u-bourgogne.fr/