

Thomas Morel

*Professor of the History
of Mathematics and its Teaching*

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Education and Employment

- 2022 – present **Professor für Geschichte der Mathematik und ihres Unterrichts**
W2 Professur, Bergische Universität Wuppertal (NRW, Germany)
- 2015 – 2022 **Maître de conférences en histoire des mathématiques**
Laboratoire de Mathématiques de Lens (EA 2462) and University of Lille (France)
◇ 2020 Visiting scholar at the Max-Planck-Institute for the History of Science, Berlin
- 2013 – 2015 **Postdoctoral fellow**
Berlin Center for the History of Knowledge, Technical University of Berlin
- 2009 – 2013 **PhD in Epistemology and history of sciences**
Université de Bordeaux (France). Thesis title: *Mathématiques et politiques scientifiques en Saxe (1765-1851). Institutions, acteurs et enseignements*. Supervisors: Pascal Duris and Layla Raïd

Publications

Books

- 2022 *Underground Mathematics. Craft Culture and Knowledge Production in Early Modern Europe*, Cambridge, Cambridge University Press, 292 pages.
◇ Reviewed in *Nuncius*, *zbMath*, the *Journal for Design History*, the *Journal of History of Science and Technology* and by *The Renaissance Mathematicus*.
- 2015 *Von der akademischen zur praktischen Mathematik (1765–1851). Mathematisch-technische Bildung zwischen sächsischer Bergakademie und polytechnischer Schule Dresden*, Berlin, Diachron-Verlag, 353 pages.
◇ Reviewed in *Der Anschnitt* and in *Technikgeschichte*.

Edited Volumes

- 2022 *Mathématiques professionnelles (XVI-XIX siècle)*, with Thomas Preveraud, special issue of the *Cahiers François Viète*, 2022 (see the volume introduction p. 5-22).
- 2016 *The Making of Useful Knowledge* (30-31 October 2014, with G. Parolini et C. Pastorino), *Preprint Series* of the Max-Planck-Institut für Wissenschaftsgeschichte, vol. 481, 91 pages.

Refereed Journal Articles and Book Chapters:

↪ *this is a selection of significant and recent publications, a comprehensive list is available here.*

- forthcoming* "Les publications périodiques comme miroir de l'évolution des mathématiques en langue allemande (1780-1830)", in Hélène Gispert, Philippe Nabonnand and Jeanne Peiffer, *Cirmath forthcoming, 2024*.
- 2024 "Mathematics and Technological Change (1450-1686) : The Silent Rise of Practical Mathematics", in Jeanne Peiffer and Volker Remmert (eds.), *Bloomsbury Cultural History of Mathematics*, vol. 3, pp. 179-206
- ◇ "'All of this was born on paper': The Mathematics of Tunnelling in Eighteenth-Century Metallic Mines", in Christopher Hollings and Philip Beeley (eds.), *Beyond the Learned Academy: The Practice of Mathematics 1600–1850*, Oxford, Oxford University Press, pp. 314-337.
- 2022 "New Objects, Questions, and Methods in the History of Mathematics", avec Jenny Boucard, in *Histories*, special issue (*New Histories of Science, in and beyond Modern Europe*, vol. 2(3), pp. 341-351.

- ◇ "Incorporer, consolider et transmettre : Géométrie pratique et savoirs miniers à l'époque moderne", in *Les ingénieurs, des intermédiaires ?*, Toulouse, Presses Universitaires du Midi, pp. 173-186.
- 2021 "Enseigner les mathématiques dans une région minière: prégnance du contexte local dans les Monts Métallifères de Saxe", in Renaud d'Enfert and Virginie Fonteneau (dir.), pp. 81-101.
- 2020 "De Re Geometrica: Writing, Drawing and Preaching Mathematics in Early Modern Mines", in *Isis, A Journal of the History of Science Society*, 111(1), pp. 22-45.
 - ◇ "Markscheidekunst und die Anwendung der Mathematik im frühneuzeitlichen Bergbau", in Rainer Gebhardt (ed.), *Die Entwicklung der Mathematik in der frühen Neuzeit*, 2020, pp. 301-312.
- 2018 "Five Lives of a *Geometria subterranea* (1708-1785). Authorship and Knowledge Circulation in Practical Mathematics", in *Revue d'histoire des mathématiques*, 24(2), pp. 207-258.
 - ◇ "Julius Weisbach's Pioneering Contribution to Orthogonal Linear Regression (1840)", with D. Stoyan, in *Historia Mathematica*, 45(1), 2018, pp. 75-84.
 - ◇ "Was ist praktisch am mathematischen Wissen? Die Positionen des Bergmeisters J. A. Scheidhauer und des Baumeisters C. F. Steiner in der Zeit um 1800", with K. Klinger, in *NTM Zeitschrift für Geschichte der Wissenschaften, Technik und Medizin* 26, pp. 267-299.
- 2017 "Bringing Euclid into the Mines: Classical Sources and Vernacular Knowledge in the Development of Subterranean Geometry", in *Translation and the Circulation of Knowledge in Early Modern Science*, Fransen S., Hodson N. and Enenkel K. (éds.), Brill, pp. 154-181.
- 2015 "Le microcosme de la géométrie souterraine : échanges et transmissions en mathématiques pratiques", in *Philosophia Scientiæ*, special issue *échanges mathématiques : études de cas (XVIIIe-XXe siècles)* 19/2, pp. 17-36.
 - ◇ "Une révolution peut en cacher d'autres. Le paysage morcelé des mathématiques dans l'espace germanophone et ses reconfigurations", with M. Bullynck, in *Sciences mathématiques 1750-1850 : continuités et ruptures*, C. Gilain and A. Guilbaud (éds.), CNRS Editions, pp. 181-206.
- 2014 "Arithmetical Periodicals in late Eighteenth-Century Germany: 'Mathematics for the Use and the Pleasure of Civic Life'", in *Archives Internationales d'Histoire des Sciences*, 64-172/173, pp. 397-427.
- 2013 "Mathématique et *Naturphilosophie* : L'exemple de la controverse entre J.J. Wagner et J. Schön (1803-1804)", in *Revue d'Histoire des Sciences*, 66(1), pp. 73-105.

Conferences proceedings and textbooks chapters:

- 2023 "Johann Berger, Abraham von Schönberg und die Freiberga Subterranea", in *Montanhistorisches Kolloquium (MHK) 2023*, pp. 65-88.
- 2019 "Subterranean geometry and its instruments: About practical geometry in the Early Modern Period", in *Oberwolfach Reports* 58, MFO, pp. 80-83.
- 2016 "The Making of Useful Knowledge" (Conference held in October 2014), T. Morel, G. Parolini and C. Pastorino (editors), in the *Preprint Series* of the Max-Planck-Institut für Wissenschaftsgeschichte MPIWG, vol. 481, 91 pages.
 - ◇ "Usefulness and Practicability of Mathematics: the German Mining Academies in the 18th century", in *The Making of Useful Knowledge*, Max-Planck-Institut für Wissenschaftsgeschichte, *Preprint Series* vol. 481, pp. 49-63.

Popularization:

- 2023 Interview on The Thinker's Garden (March 19).
 - ◇ Blog post for the *History of Knowledge* blog of the German Historical Institute: "Why Should You Trust Geometry?" (August).
- 2021 "La géométrie des mines à la Renaissance : Discours et pratiques", in *L'Esprit d'Archimède*, vol. 5, 2021, pp. 11-13.

- 2018 "Une nouvelle forme de propriété", with H. Morel, in *Alternatives économiques* (février 2018, p. 61, extended version available online).
- 2016 "Une des plus belles applications de la géométrie' : les manuscrits de géométrie souterraine au XVIIe siècle", in *Images des mathématiques*, CNRS (15.09.2016).
- 2015 "Ce que la réunification allemande nous enseigne sur la crise grecque actuelle", in *AlterEcoPlus* (17.07.2015).
- 2013 "Les Trente Immortelles de Genève et la dette du royaume de France", in *Alternatives économiques* (septembre 2013, pp. 79-80).
- ◇ "Vive la Banqueroute, comment la France a réglé ses dettes de Philippe Le Bel à Raymond Poincaré", Thomas Morel and François Ruffin (dir.), Fakir éditions, 128 p.

Translation:

- 2019 "Le thème de la triste et laide Kovalevskaya", translation of E. Kaufholz-Soldat (from German) for *Images des mathématiques*, CNRS (28.09.2021).
- 2019 "Analyse des imageries des instruments scientifiques de l'époque moderne (XVIe-XVIIe siècle), translation of V. Remmert (from German) for *Images des mathématiques*, CNRS (29.05.2019).
- 2013 "Mr. Strawson sur la théorie logique", translation (with Dr. L. Raïd) of W.O. Quine, in *Les voies du paradoxe* Paris, Vrin, pp. 249-279.

Book reviews:

- 2022 *Technoscience in History. Prussia, 1750-1850*, Ursula Klein (Cambridge, The MIT Press, 2020), in *Centaurus*, 64(1), p. 297-300.
- 2020 *Sailing School. Navigating Science and Skill, 1550-1800*, Margaret Schotte (Baltimore, John Hopkins University Press, 2019), in *Revue d'histoire des sciences*, 73(2), pp. 384-386.
- 2018 *Mobilités d'ingénieurs en Europe, XVe-XVIIIe siècle*, Stéphane Blond, Liliane Hilaire-Pérez and Michèle Virol (dir.) (Rennes : PUR, 2017), in *Artefact*, 8, pp. 355-358.
- ◇ *Mathematical Practitioners and the Transformation of Natural Knowledge in Early Modern Europe*, Lesley B. Cormack, Steven A. Walton, John A. Schuster (eds), *Studies in History and Philosophy of Science* 45 (Wiesbaden : Springer, 2017), in *Revue d'histoire des sciences*, 71(1), pp. 114-116.
 - ◇ *Les chaires et l'esprit. Organisation et transmission des savoirs au sein d'une université germanique au XVIIe siècle*, Boris Klein (Lyon, Presses Universitaires de Lyon, 2017), in *Revue d'histoire des sciences*, 71(1), pp. 123-124.
- 2014 *Mathematik im Prozess : Philosophische, Historische und Didaktische Perspektiven*, M. Rathgeb, M. Helmerich, R. Krömer, K. Lengnink and G. Nickel (éds.) (Wiesbaden : Springer, 2013), in *Essais : Revue interdisciplinaire d'Humanités*, 4, pp. 185-188.
- 2013 *The Disordered Police State, German Cameralism as Science and Practice*, Andre Wakefield (Chicago : University Press, 2009), in *Revue d'histoire des sciences*, 66(1), pp. 224-226.

Work in progress:

- ◇ Translation and commentary of the "New book on subterranean geometry" (*Neu Markscheide-Buch*) by Adam Schneider (c. 1669).

Scientific presentations and Conferences

↪ for a complete list, see <http://morelthomas.com/communications/>

- 2024 "Cultures of Accuracy in Early Modern Mathematics: Precision, Approximation and Correctness", panel at the ESHS Meeting, Barcelona, September.
- ◇ "Pratiques de la quantification et statut des mathématiques à l'époque moderne", Université de Nancy, 17 May.
 - ◇ ""Es kan niemand durch den Stein sehen": Trust, Expertise and the Underground in the Early Modern Period", Medieval Undergrounds symposium, University of Toronto, 5-7 May.

- ◇ "Mathematics for the "Common Man": Practitioners, Teachers and the Early Modern Mathematical Life", meetin 'New directions in History of Mathematics: Research and Teaching', Open University **Milton Keynes**, 25 April.
 - ◇ "Practical Arithmetic between Theory and Practices (15th-16th cent.)", Normative Texts and Occupational Practices, ETH **Zurich**, 9-10 February.
 - ◇ "Que nous disent les encyclopédies hors-normes sur les usages des mathématiques de leur époque ?", Patrimoine et patrimonialisation des mathématiques (XVIIIe-XXe siècle), CIRM, **Marseille**, 8-12 January.
- 2023 "The Future of History of Science and Technology: A French Perspective", during the DHST Global History of Science and Technology Festival 2023, session 15 / **online**, September 29 (see video here)
- ◇ "'A Matter of Experimental & Workmanly Mathematics". Quantifying, Measuring and Writing in Mining Craft", Joint Masterclass Program, Artisanal Modes of Writing, Drawing, and Modeling, 1400-1830, Columbia University, **New York**, September 29.
 - ◇ "The Circulation of Practical Mathematics: Examples from the Holy Roman Empire", 10th annual meeting of Scientiae, **Prag**, June 7.
 - ◇ "An die Mathematik glauben: Geometrie und die Bergpredigten in der frühen Neuzeit" Oberseminar Frühe Neuzeit, Universität **Gießen**, June 5.
 - ◇ "Johann Berger, Abraham von Schönberg und die Freiberga Subterranea (1686-1693)", Montanhistorisches Kolloquium 2023, **Goslar** (Germany), June 3.
 - ◇ "History of the Earth Sciences Reading Group, University of Leeds, discussion of the seventh chapter of *Underground Mathematics*, online, March 30.
 - ◇ "Épistémologie artisanale et circulation des connaissances : La géométrie souterraine à l'époque moderne", Séminaire d'histoire des mathématiques, Université de **Lille**, March 24.
 - ◇ "Les Manuels Roret et la patrimonialisation des mathématiques (1822-1939)", Seminar of the ANR-project Patrimaths, **Paris**, March 6.
 - ◇ "'All of This Was Born on Paper': Craft Culture and Knowledge Production in Mine Surveying (1500-1800)", **Munich** (Germany).
 - ◇ Antrittsvorlesung, Mathematisches Kolloquium, Bergische Universität **Wuppertal** (Germany), January 10th.
- 2022 "Underground Mathematics. Handwerkskultur und Wissensproduktion im frühneuzeitlichen Europa", IZWT-Kolloquium, Bergische Universität **Wuppertal** (Germany), October 19th.
- ◇ "The Mathematical Education of Practitioners and Its Sources (16th-19th century)", 7th International Conference on the History of Mathematics Education (ICHME), **Mainz** (Germany), September 19-23th.
 - ◇ "Artisanal Practices and Mathematics between the Ore Mountains and the Court of Dresden", 10th Conference of the European Society for the History of Science, in the session *Scholarly and artisanal mathematics in the Early Modern Period*, **Brussels** (Belgium), September 7-10th.
 - ◇ "'So Fair a Subterraneous City': Mining, Maps, and the Politics of Geometry in the Seventeenth Century", History of Mathematics Seminar, **Oxford** University, June 9th.
 - ◇ "'Es mathematisch wieder zu erfinden': Wissenschaft, Innovation und Bergbau im späten 18ten Jh.", *RheWeSe*, Seminar zur Geschichte und Philosophie der Mathematik, **Hagen**, June 3rd.
 - ◇ "The Mines and the Court: Artisanal Practices and Mathematics in Early Modern Dresden", Princeton-Bucharest Seminar in Early Modern Philosophy, online, May 10th.
- 2021 "Géométrie, géographie et cartographie à l'époque moderne", Journée d'études L'histoire des sciences aujourd'hui, **Bordeaux**, November 17th
- ◇ "'Eine der schönsten Anwendungen der Geometrie': Die Berechnung des Tiefer-Georg Stolens (1771-1799)", Landeshistorisches Kolloquium, Universität **Göttingen**, November 10th.

- ◇ "Prêcher la géométrie : les sermons miniers de Johannes Mathesius et Cyriacus Spangenberg", séminaire d'histoire des mathématiques de **Lille**, March 11th.
 - ◇ "Écrire, dessiner et prêcher des pratiques mathématiques dans les mines de l'époque moderne", séminaire " Histoire des sources, histoire du texte", laboratoire SPHERE, Université **Paris-Diderot**, January 14th.
- 2020 "One of Geometry's Nicest Application": Digging the Georg-Tiefer Stollen (1771-1799), Max-Planck Institut für Wissenschaftsgeschichte, Department III Colloquium, **Berlin**, June 2nd.
- 2019 "The Silent Rise of Practical Mathematics (1450-1686)", IZWT, Bergische Universität Wuppertal, 11 décembre.
- ◇ "Unterirdische Mathematik. Zur Darstellbarkeit der Vermessung von Gruben und Stollen in der Frühen Neuzeit", IZWT, Bergische Universität **Wuppertal**, 11 décembre.
 - ◇ "Writing, Drawing, and Preaching Geometry in the Early Modern German Mines", 2019 meeting of the History of Science Society, session "Practical Mathematics in Early Modern Europe", organized by myself, **Utrecht**, July 23-27.
 - ◇ "Résoudre par l'arithmétique ou par la géométrie : sur l'utilisation des cartes en géométrie souterraine (XVIIIe siècle)", séminaire "Approches historiques, philosophiques et anthropologiques des nombres, de la mesure et de la mesurabilité", laboratoire SPHERE, **Paris** 7, June 14th.
 - ◇ "Mathematik in Bergwerken der frühen Neuzeit: Wer, wie und warum?", Ringvorlesung zur Geschichte der Mathematik, Studium Generale, TU Bergakademie **Freiberg**, February 4th.
- 2017 "Subterranean geometry and its instruments: about practical geometry in the Early Modern Period", meeting *Mathematical Instruments between Material Artifacts and Ideal Machines: their Scientific and Social Role before 1950*, Mathematisches Institut **Oberwolfach**, December 17-23.
- ◇ "The Geometria subterranea manuscripts (1600-1750): Knowledge transmission in a practical context", in the Symposium S 093 (Specificities of scientific or scholarly documents as a reflection of curricula) if the 25th International Congress for the History of Science, Technology and Medicine (iCHSTM), **Rio de Janeiro**, July 24th.
 - ◇ "Practical Geometry in early modern Germany: Miners and Scholars, Instruments and Theories", seminar "Early Modern Mathematical Instruments And Their Users", organized by Antoni Malet and Elena Ausejo, Universitat Pompeu Fabra, **Barcelone**, March 23-24.
- 2016 "Circulating mining knowledge from Freiberg to Almaden: The life and career of J.M.Hoppensack (1741-1815)", colloquium *Sciences, savoirs et politique : Alexander von Humboldt et Aimé Bonpland entre Europe et Amérique Latine*, session organized by Jacob Vogel, **Paris**, SciencesPo / IHEAL, July 6th.
- ◇ "Subterranean geometry and its measurement units (16th-18th centuries)", séminaire d'histoire et philosophie du laboratoire SPHERE (SAW), 'Measurement units in the history of mathematics and beyond', **Paris**, April 4th.
- 2015 "J.A. Scheidhauer und die Markscheidkunst: Beispiel einer Mathematisierung für die Praxis am Ende des 18. Jahrhunderts", annual meeting of the DGGMNT (German Society for the History of Science), Technische Universität, **Berlin**, September 25-27.
- ◇ "Underground Mathematics: Manuscripts and Knowledge Circulation in the German Mining States", 61st Annual Meeting of the Renaissance Society of America, session *The Material Culture of the Mines in Early Modern Europe* organisée par Tina Asmussen and Henrike Haug, **Berlin**, March 26-28.
- 2014 "Usefulness and practicability of Mathematics: German Mining Academies in the 18th century", workshop The Making of Useful Knowledge, MPIWG, **Berlin**, October 30-31.
- ◇ "Schoolteaching in the *Bergstaat*: mathematics in the Ore Mountains of Saxony (1750-1850)", 6th International Conference of the ESHS, in the session *Local supply of scientific and technical education*, Portugal, **Lisbon**, September 4-6.
- 2013 "Mathematics in the Mines: a Biographical Sketch of the *Markscheider* J.A. Scheidhauer (1722-1784)", during the 24th Novembertagung on the History of Mathematics, De Morgan House, **London**, November 20-22.

- ◇ "Mathematics in polytechnic schools in the German-speaking area", in the Symposium S 011 of the 24th International Congress for the History of Science, Technology and Medicine (iCHSTM), **Manchester**, July 22-28.
- ◇ "Institutional context of German mathematics at the time of publication of Lambert's *Theorie der Parallellinien*", workshop *Johann Heinrich Lambert : Science and Epistemology*, organized by Vincenzo De Risi at the Max-Planck Institut für Wissenschaftsgeschichte (MPIWG), **Berlin**, April 25th.

Scientific Service

- 2022 – present Member of the Graduiertenkolleg 2696 *Transformationen von Wissenschaft und Technik seit 1800: Inhalte, Prozesse, Institutionen*, Bergische Universität Wuppertal
- Supervision Co-advisor (*Zweitbetreuer*) of the PhD thesis of Jan Nicolay, "Welchen Einfluss hatten Forschungsschiffe auf die innere und äußere Entwicklung der Ozeanographie in Deutschland am Beispiel der Meteor I bis III?", 2022–2025.

Administration Service

- 2016 – present *Société française d'histoire des sciences et des techniques* (SFHST):
- From 2016 to 2020, in charge of the website and communication <https://sfhst.hypotheses.org/>
 - From 2020 to present, **president** of the society. Co-organization of the Bordeaux 2023 *Congrès*.
- 2020 – 2023 Member of the GDR Histoire des mathématiques. Member of the scientific committee for the 2023 Summer school at the CIRM, Marseille.
- **Book review editor** (English language) for *Historia Mathematica*.
 - Member of the **editorial board** of *Centaurus*, the official journal of the European Society for the History of Science (and part of the mentoring program), of the *Cahiers François Viète* (and responsible for volume III.16), of the column *Histoire des mathématiques* for the website *Images des maths*.
- Reviewer for the following **journals** and **book series**: *Artefact*, *Centaurus*, *E-Phaistos*, *Isis*, *Mathematical Reviews*, *Philosophia Scientiæ*, *Perspective on Science*, *Revue d'histoire des mathématiques*, *Science in Context*, *Springer* (International Archives of the History of Ideas), *Siegener Beiträge zur Geschichte und Philosophie der Mathematik*, *Technikgeschichte*.
- for the following **institutions**: Leibniz-Institut für Europäische Geschichte.
- Membership Member of the SFHST *Société française d'histoire des sciences et des techniques* and of the GWMT *Gesellschaft für die Geschichte der Wissenschaften, der Medizin und der Technik*.

Popularization

- 2020 Participation to the documentary "Die Wege des Kupfers II", produced by Stanislav Manca.
- 2013 Participation to the documentary "Lagrange", produced by the Institut Henri Poincaré (Paris) under the scientific direction of Frédéric Brechenmacher, 2013, <http://images.math.cnrs.fr/Lagrange-un-documentaire-exclusif.html>.
- 2011 – 2012 Member of the scientific council for the exhibition "Mathissime" organised by the museum Cap Sciences (Bordeaux), 2011-2012.

Awards, Honors and Grants

- 2018 *Grattan-Guinness Archival Travel Grant* for a book project on the history of subterranean geometry.
- ◇ DAAD (*Deutscher Akademischer Austauschdienst*) research grant for a two-months archive stay in Germany (July-August 2018).

- 2015 *Professor Ludwig Weickmann Foundation Prize*, Universität Leipzig for the dissertation "*Mathématiques et politiques scientifiques en Saxe (1765-1851). Institutions, acteurs et enseignements*".
- 2014 Dissertation Prize, Université de Bordeaux (IdEx), category "Sciences Humaines et Sociales" (SHS), for the dissertation "*Mathématiques et politiques scientifiques en Saxe (1765-1851). Institutions, acteurs et enseignements*".
- ◇ Travel grant from the Fritz Thyssen foundation for a research stay at the Slovaquian National Archive (Banskà Stiavnica, July).
 - ◇ Travel grant from the DAAD (*Deutscher Akademischer Austauschdienst*) to attend the International Conference of the European Society for the History of Science, Lisbon, September.
- 2013-2016 Research grant attributed by the *Berlin Center for the History of Knowledge* (MPI, HU, TU and FU Berlin), to work as an invited researcher at the Technical University Berlin.
- ◇ Travel grant for young researchers, attributed by the *Comité National Français d'Histoire et de Philosophie des Sciences* (CNFHPS) to attend the International Congress of History of Science, Technology and Medicine in Manchester, 2013.
- 2010 Research Grant from the Institut Français d'Histoire en Allemagne (IHFA), for a two-month internship at the MPIWG.
- ◇ Award "*Découverte Science*" de l'Académie Nationale des Sciences, Belles-Lettres et Arts de Bordeaux, for the Master's degree work : "*Georg Cantor et la théorie des ensembles : origine, développement et postérité d'une théorie spéculative*".