The centre Mersenne for Diamond Open Access: a summary of five years of existence

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Masterclass: Open Science and Scientific Publishing
Formation du Collège Doctoral, UGA
June 3, 2024

Plan of the talk

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The centre Mersenne

The centre Mersenne is a public comprehensive Diamond Open Access (free to read, no APC (= charge to publish)) publishing infrastructure for scientific publications.

It provides editorial teams with

- a publishing platform for hosting and dissemination of open access research publications;
- a range of editorial and technical tools and services to help to manage the journal workflow (peer-review process, publication. . .).

The centre Mersenne is developed by Mathdoc, a French Support and Research unit of CNRS Mathématiques and Université Grenoble Alpes.

Mathdoc

The centre Mersenne has been launched in 2018 with 10 mathematics journals.

CENTRE MERSENNE

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What kind of publications?

- Resarch journals and proceedings;
- newly created or already existing; flipping journals are welcome
- of all scientific disciplines in the fields of STEM (science, technology, engineering and mathematics), with an initial kernel in maths;
- compliant with best editorial practices;
- formatted with LaTeX ideally;
- published in Diamond Open Access (no charge to read, no charge to publish). The articles are distributed with a Creative Commons CC-BY licence.

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Why creating centre Mersenne ? (in three slides)

Evolution of public expenditures for scientific publication in France

- Cost of APC for French institutions in 2020: 30,1M€. This cost has been multiplied by 3 between 2013 and 2020.
- Cost of subscriptions: 87,5M€ in 2020. Has been continuously increasing since 20 years (in average + 1,76 % since 2014).
- 25% of published articles by a French author has been paid by APC in 2020.
- The sum of two bills (APC + subscriptions) is increasing.

Source : Étude "Retrospective and prospective study of the evolution of APC costs and electronic subscriptions for French institutions" (2022)

Why creating centre Mersenne ? (in three slides)
Prospective reflections on public expenditures devoted to scientific publishing in France

- If the current trend continues
  - Total cost of APC : 50,6 M€ in 2030
  - Total cost of subscriptions: 97,5M€ in 2030.
- If open access with APC speeds up
  Total cost of APC: 68,7 M€ in 2030
- Theoretical asymptotics: 90% of articles published with APC, and 10% in diamond OA: 168,7 M€ in 2030.

Source : Étude "Retrospective and prospective study of the evolution of APC costs and electronic subscriptions for French institutions" (2022)

Why creating centre Mersenne ? (in three slides)

A very brief (and incomplete) history of open access

- 2001 *Budapest Open Access Initiative*: principle statement for open access, recommendation for institutional self-archiving.
- 2012 *The Cost of Knowledge*: Elsevier boycott
- 2016 *Loi pour une République Numérique:* allows self-archiving of accepted papers on HAL or ArXiv after at most 6 months (for sciences and techniques)
- 2018
  - End of the national agreement with Springer.
  - Launching of centre Mersenne.
  - First *Plan national pour la science ouverte/*
- 2021 Second *Plan national pour la science ouverte*. Official support of the diamond model.
- 2022 *"Le CNRS demande instamment à ses chercheurs et à ses chercheuses de ne surtout pas payer pour publier un article"*

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Centre Mersenne trajectory

- 2018 10 journals, 210 articles published (7 000 pages). *Mathematics*.
- 2019 13 journals, 270 articles published (9 000 pages).
  + *Geomechanics*
- 2020 21 journals, 600 articles published (12 700 pages)
  + *Chemistry, Physics, Biology, Earth Sciences* (= *Comptes Rendus de l'Académie des sciences*)
- 2021 22 journals, 884 articles published (17 834 pages) + *several scientific disciplines* (= *Peer Community Journal*)
- 2022 23 journals, 872 articles published (18 804 pages)
- 2024 24 journals, + *Maths/Computer Sciences*.

Thematic distribution

- *Maths* (16 journals + 1 book + 6 seminars)
- *AI* (1)
- *Physics* (1), *Mechanics* (1), *Geomechanics* (1), *Biology* (1), *Chemistry* (1), *Earth Sciences* (1)
- *Multi-disciplinary journal in Sciences and Techniques* (1).

The dissemination platform

centre-mersenne.org/en/

Numdam Mathdoc

CENTRE MERSENNE

ABOUT OUR JOURNALS OUR SERVICES JOIN US TOOLBOX NEWS

THE CENTRE MERSENNE ▶

An open access publishing platform for scientific publications.

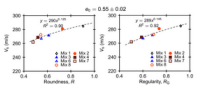
The centre Mersenne is a diamond open access scientific publishing infrastructure developed by Mathdoc, a support and research unit of CNRS and Université Grenoble Alpes. The centre Mersenne provides all the publishing tools and services that enable editorial teams to manage, produce and distribute their publications.

The journals, books, proceedings or seminars are from all scientific disciplines, composed in LaTeX and distributed in open access.

Some journals websites

OPEN GEOMECHANICS

HOME ABOUT SUBMIT

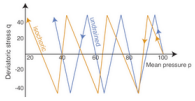


Effects of Particle Shape on the Shear Wave Velocity and Shear Modulus of 3D Printed Sand Analogs

Ahmed, Sheikh Sharif; Martinez, Alejandro

Isolating the effects of individual particle properties (e.g. shape, size, mineralogy, surface roughness) on...

Published: 2022-03-16 **PDF**

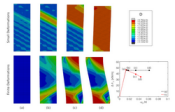


Removal of the membrane penetration error from triaxial data

Niemunis, Andrzej; Knittel, Lukas

Most triaxial tests are fraught with substantial membrane penetration errors. A simple correction...

Published: 2020-12-09 **PDF**

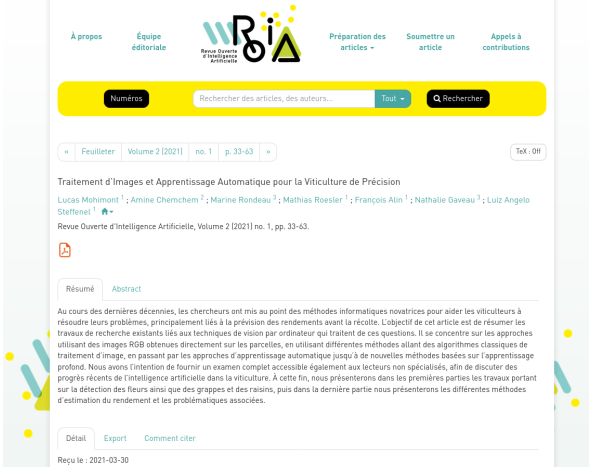


Finite deformation hyperplasticity theory for crushable, cemented granular materials

Oliynyk, Kateryna; Tamagnini, Claudio

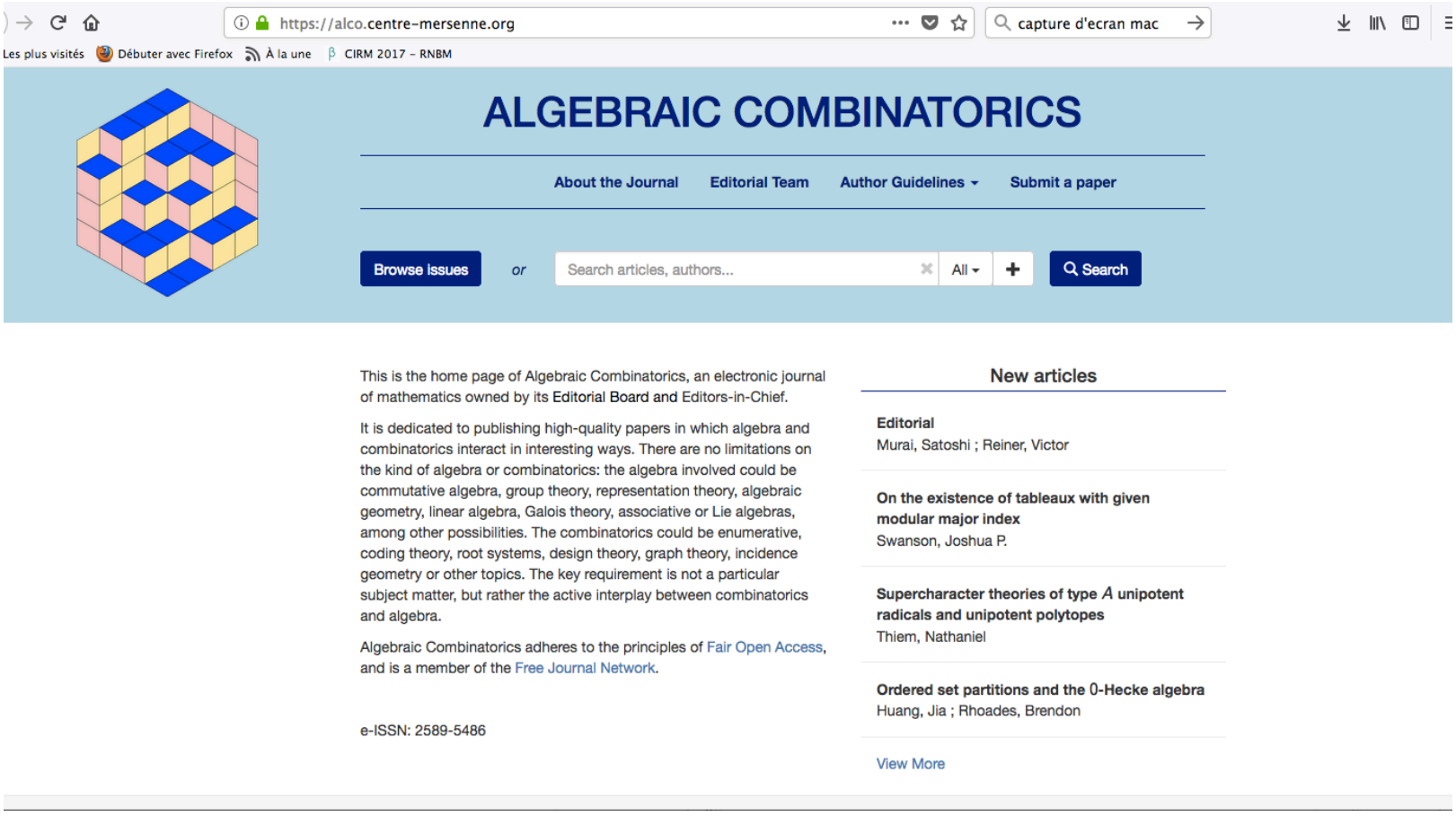
The work is focused on the formulation of a thermodynamically–based...

Published: 2020-11-16 **PDF**



One website: les Annales de l'institut Fourier

Another website: Algebraic Combinatorics



Related platforms of publication

- Episciences (épiMaths for mathematics), developed by the french unit CCSD (CNRS & french universities), an overlay journal platform based on the open institutional repository HAL;
- SciPost (mainly Physics);
- OpenEdition for social sciences and humanities, developed by CNRS & french institutions
- SciELO, Redalyc-AmeliCA (platforms for journals (mainly) based in South America, all scientific disciplines), eLibM (supported by German institutions), ...

Plan of the talk

The staff

The team is composed of Mathdoc staff $\simeq$ 14 people $\simeq$ 9 FTE dedicated to the centre Mersenne:

- 1 coordinator
- 1 editor
- 1 managing editor
- 2 typesetter LaTeX/XML,
- 6 IT developers,

\+ administrative support,

- scientifically led by 2 mathematicians.

10 members hold a permanent position.

(+ 2 freelances for part of the typesetting activity).

Governance

- The scientific council
  - evaluates candidate journals;
  - advises on orientations and priorities;
  - comprises 8 to 12 scientists (mainly mathematicians) assisted by a pool of experts.

- The steering committee
  - takes advice from the scientific council;
  - decides on priorities and allocates resources;
  - comprises Mathdoc directors and representatives of Mersenne's supporting institutions.

Plan of the talk

Editorial services

The essential editorial services systematically provided:

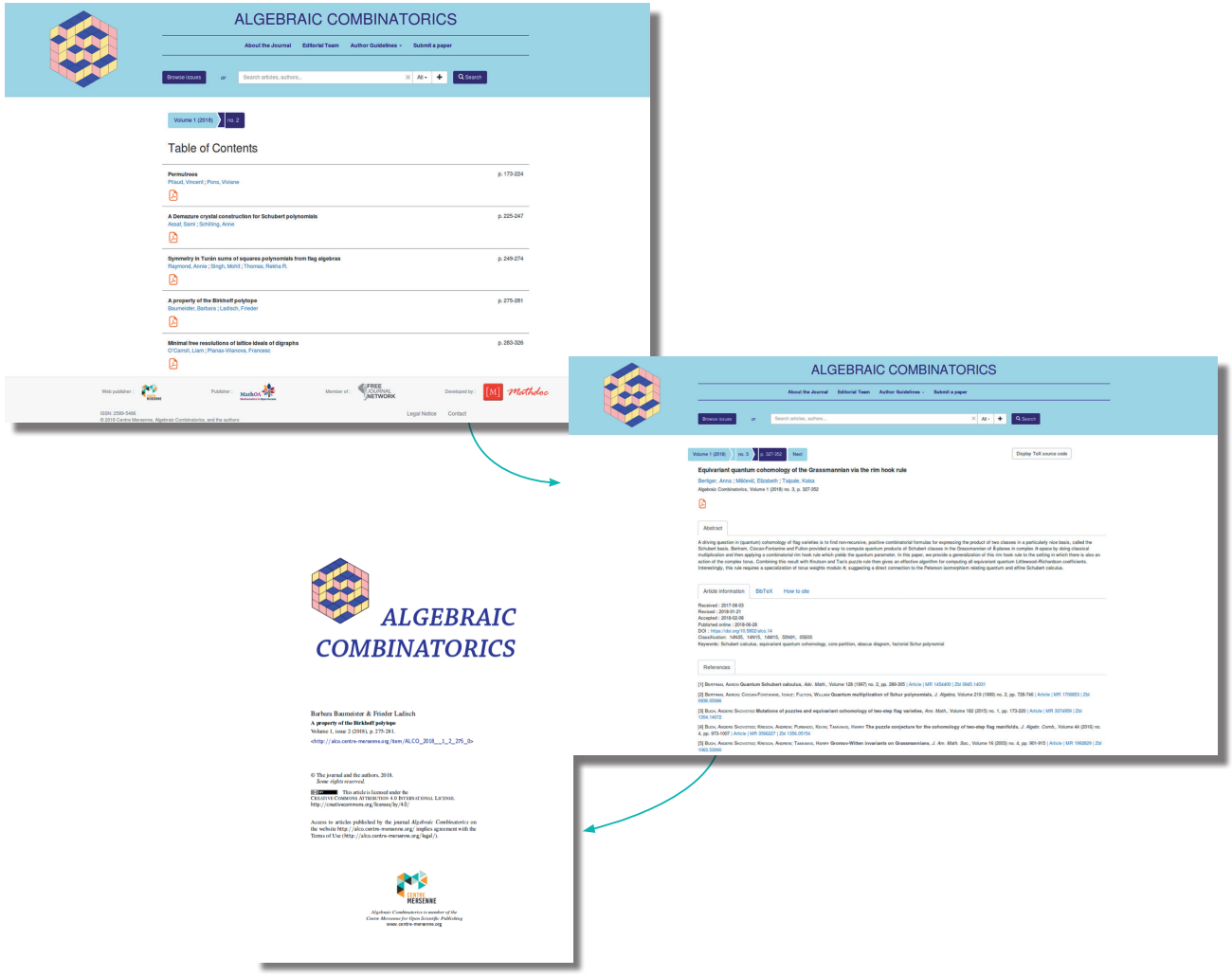
- Online publication and dissemination of articles on the centre Mersenne platform:
  - creation of a specific and customised website for each publication
  - attribution of DOI (Digital Object Identifier) with Crossref
  - crosslinking with reference databases, interoperability, an OAI-PMH server...
  - long term preservation through CLOCKSS
  - plagiarism detection
  - Statistics "counter", cited-by tool
- Creation of a customised LaTeX template
- Installation and maintenance of Open Journal System (OJS):
  - customisation of a dedicated instance adapted to the editorial board's evaluation process;
  - maintenance and support;
  - documentation and training.

Optional services

- LaTeX typesetting and layout editing;
- copyediting, proofreading
- managing editor, journal workflow assistance;
- printing (on demand or a posteriori);
- ...

Browsing

Browsing a journal website and accessing articles. . .



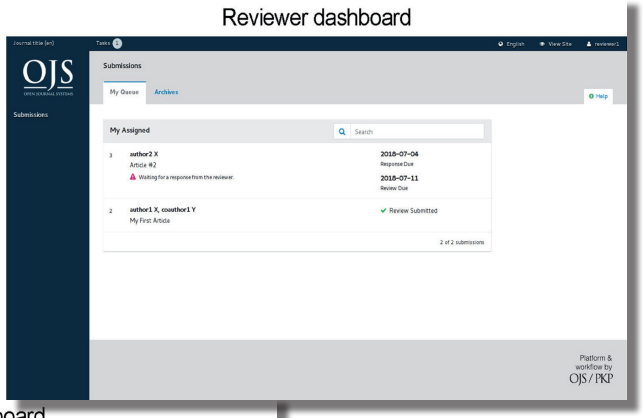
Searching

Searching articles in a journal website. . .

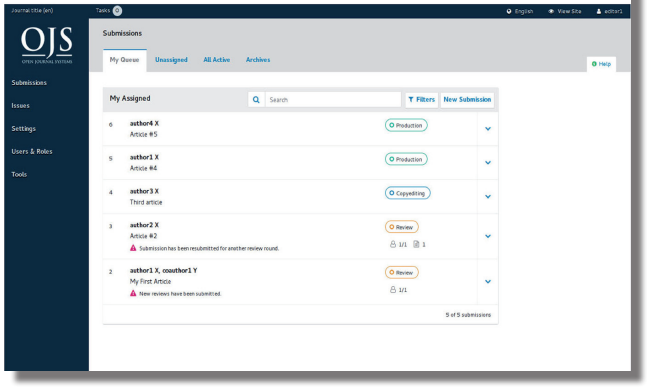
OJS

Managing submissions. . .

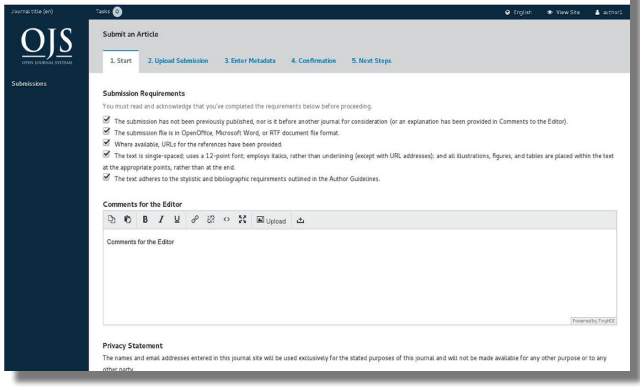
Reviewer dashboard



Editor dashboard



Author submission



Plan of the talk

Average production cost of an article at centre Mersenne (2020 - 2021)

Production cost per article or page (estimate)

- Production cost per article: 810 € (all journals) /780 € (when not including *Comptes Rendus*)/ 140 € for *Peer Community Journal*
- Production cost per page: 41 € (all journals)/ 28,5 € (when not including *Comptes Rendus*)

This does not take into account: volunteer work of researchers, editorial management, ...

Business model - general ideas

- Our model is Diamond OA: No fees for the authors, no fees for the readers.
- Our business model must be scalable and sustainable to welcome 1 to 3 new journals per year.
- So we need to recover at least running costs from the journal or from the organisations that support it.
- But our costs have to remain very low, when not zero, especially for the journals that have few financial means.

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Business model - structure of costs

- General running of the infrastructure and essential publication services
  - Almost completely supported by CNRS and Univ. Grenoble (staff, costs)
  - + a modest journal annual subscription (not applicable for journals supported by CNRS)
  - + funding from institutions, foundations, libraries;
- Recurrent costs associated to optional services, proportional to the volume published: covered by invoicing the journal or its supporting institution(s) at cost price or by specific institutional supports. (not applicable for journals supported by CNRS)

Plan of the talk

A journal flipping: Algebraic Combinatorics

- History and setting: in 2018, almost all the editors of the *Journal of Algebraic Combinatorics* published by Springer resign from that journal.

  They create and become editor of a new journal published by centre Mersenne, under the new name: *Algebraic Combinatorics*. Springer retains the property of the title *Journal of Algebraic Combinatorics*.

- Volume: 700 pages in 2018, more than 1300 pages in 2019, 2020, 1100 pages in 2021, 1400 in 2022

- Legal publishers: association MathOA until 2021, The Combinatorics Consortium since 2022.

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Another journal flipping: Les Comptes Rendus de l'Académie des sciences

- *Les Comptes Rendus de l'Académie des sciences* is the journal of the French Academy of sciences created in 1835 by the physicist François Arago. It is divided in seven titles: *Mathematics*, *Physics*, *Biology*, *Mechanics*, *Chemistry*, *Earth Sciences*, *Paleontology*.
- 1997-2019: Published by Elsevier.
- In 2020, under the initiative of Etienne Ghys, *Les Comptes Rendus de l'Académie des sciences* becomes a Diamond journal published by the centre Mersenne.
- Volume: around 5000 pages per year.
- Legal publisher & owner of the title: Académie des sciences
- Financial support: CNRS in 2020, Académie des sciences...

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A common challenge for Académie des sciences and centre Mersenne

- Doubling the publication volume of the centre Mersenne.
- New disciplines $\rightsquigarrow$ new purposes, new formats (LaTeX or word with HTML), indexation to new databases, new templates.
- New metadata: Orcid identifiers, Equal Contrib...
- For the centre Mersenne, need to scale-up our administrative and financial procedures (public markets for suppliers, diffusion agreements with journals, official pricing).
- For the Académie des sciences, need to find a recurrent funding for the production costs.
- This transition has revitalized the journal and led to new projects: semi-automatic translation, on-line comments (on-going)

The website of Comptes Rendus - Géoscience

Journal layout: Physics

INSTITUT DE FRANCE
Académie des sciences

Comptes Rendus

Physique

Yosef Nir and Vincenzo Vagnoni

***CP* violation in *B* decays**
Volume 21, Issue 1 (2020), p. 61-74.
<https://doi.org/10.5802/crphys.11>

Part of the Thematic Issue: A perspective of High Energy Physics from precision measurements
Guest editors: Stéphane Monteil (Clermont Université, CNRS/IN2P3, Clermont-Ferrand) and Marie-Hélène Schune (Université Paris-Saclay, CNRS/IN2P3, Orsay)

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Les Comptes Rendus. Physique *sont membres du Centre Mersenne pour l'édition scientifique ouverte*
www.centre-mersenne.org

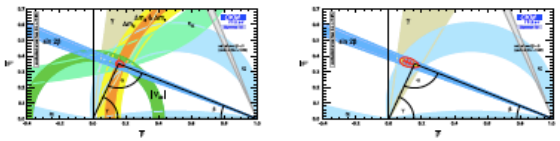

Figure 1. The constraints in the $(\bar{\rho},\bar{\eta})$ plane from (left) all relevant processes, and (right) from *CP*-violating asymmetries in *B* decays only [31].

4. The CKM mechanism and *CP* violation in beauty

The three-generation SM violates *CP*. Among the parameters of the SM Lagrangian, there is a single phase (or, equivalently, a single imaginary parameter), which appears in V, the CKM matrix that parametrises the W^+ interactions with $\overline{u}_{Li}d_{Lj}$ pairs (where $u_{1,2,3}=u,c,t$, and $d_{1,2,3}=d,s,b$)

$$\mathscr{L}_{W,q}=-\frac{g}{\sqrt{2}}\overline{u}_{Li}V_{ij}\,W^{+}d_{Lj}+\text{h.c.} \tag{12}$$

The CKM matrix depends on three real and one imaginary parameters. The Wolfenstein parametrisation is particularly useful

$$V=\begin{pmatrix}1-\frac{1}{2}\lambda^2 & \lambda & A\lambda^3(\rho-i\eta)\\ -\lambda & 1-\frac{1}{2}\lambda^2 & A\lambda^2\\ A\lambda^3(1-\rho-i\eta) & -A\lambda^2 & 1\end{pmatrix}. \tag{13}$$

The fact that all quark flavour-violating processes and all *CP*-violating processes depend on only three real (λ, A, ρ) and one imaginary $(i\eta)$ parameters makes the (C)KM mechanism of flavour and *CP* violation subject to stringent tests. Here, *CP*-violating processes play a special role. The fact that *CP* is a good symmetry of the strong interactions implies that *CP* asymmetries dominated by interference of decays with and without mixing are subject to a uniquely clean theoretical interpretation. Thus, for example, within the SM

$$\mathscr{I}m(\lambda_{\psi K_S})=\frac{2\eta(1-\rho)}{\eta^2+(1-\rho)^2}, \tag{14}$$

with hadronic uncertainties entering only at the level of a few permil corrections.

In the literature, one often defines $\rho+i\eta=-(V_{ud}V_{ub}^*)/(V_{cd}V_{cb})$ which is valid to all orders in λ. The parameters ρ and η approximate $\bar{\rho}$ and $\bar{\eta}$ to order λ^2. The various constraints in the $(\bar{\rho},\bar{\eta})$ plane are presented in Figure 1. *CP* asymmetries in *B* decays are playing a major role: $\mathscr{A}_{\psi K_S}, \mathscr{A}_{\pi\pi}$ and the *CP* asymmetry in $B\to DK$ decays constrain with impressive accuracy the angles

$$\alpha=\arg\left(-\frac{V_{td}V_{tb}^*}{V_{ud}V_{ub}^*}\right),\quad \beta=\arg\left(-\frac{V_{cd}V_{cb}^*}{V_{td}V_{tb}^*}\right),\quad \gamma=\arg\left(-\frac{V_{ud}V_{ub}^*}{V_{cd}V_{cb}^*}\right), \tag{15}$$

respectively. As there is a region in the $(\bar{\rho},\bar{\eta})$ plane that is consistent with all measurements, the CKM mechanism of flavour violation and the KM mechanism of *CP* violation provide a consistent explanation of all data.

5. Probing new physics with *CP* violation in *B* decays

The consistency of the measured *CP* violation in *B* decays with the SM predictions leads to strong constraints on new physics. In the previous section, we assumed that the various flavour-violating and *CP*-violating observables are accounted for by the CKM matrix, and tested the

Journal layout: Chemistry

INSTITUT DE FRANCE
Académie des sciences

Comptes Rendus

Chimie

J. Brahmi, S. Nasri, H. Saidi, K. Aouadi, R. Sanderson, M. Winter, D. Cruickshank, S. Najmudin and H. Nasri

Optical and photoelectronic properties of a new material: Optoelectronic application

Volume 23, issue 6-7 (2020), p. 403-414.

<https://doi.org/10.5802/crchim.20>

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Les Comptes Rendus. Chimie *sont membres du Centre Mersenne pour l'édition scientifique ouverte*
www.centre-mersenne.org

Table 3. Electrical parameters of the |TiO/Pt/Al| system

Complex	I_s (A)	ϕ_b (V)
$[Zn(TFMPP)(4,4'\text{-bipy})]\cdot 2(4,4'\text{-bipy})\cdot 2H_2O$	6.027×10^{-9}	1.2533

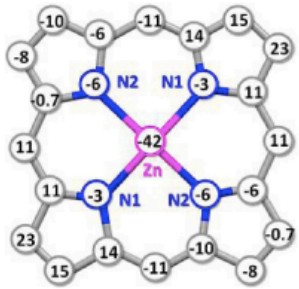


Figure 4. Schematic representation of the porphyrin macrocycle of the |Zn(TFMPP)(4,4′-bipy)| complex showing the displacements of each atom from the 24-atom mean plane in units of 0.01 Å.

$|Zn^{II}(TFMPP)(HMTA)|$, we note that our complex (I) has a high barrier height ϕ_b compared to the related zinc-HMTA derivative. This is most probably due to the aromatic ligand 4,4′-bpy for (I), which can prevent the distribution of the charge contrary to the case of the related species containing the non-aromatic ligand HMTA.

It is the same for the saturation current 6.027×10^{-9} for our zinc(II)-4,4′-bipy derivative, which is very low compared to that of the related $|Zn^{II}(TFMPP)(HMTA)|$ complex whose value is equal to 6.57×10^{-6}. These results show that the nature of the axial ligand plays a very important role in the optoelectronic properties for this type of porphyrin compound.

The variation of I as a function of V has been represented in a log–log plot to better study the mechanism of electrical conductance across the junction (Figure 9).

For complex (I), as shown by this figure, there are different regions where the current varies as a function of the potential according to the relation $I = V^m$, where m represents the slope for each region and provides information about the type of conduction mechanism.

The slope value is close to unity at low voltage defining the ohmic region. In this region, the presence of a small amount of interface barrier hinders charge injection. In this case, the density of thermally excited load carriers is insufficient and trap levels are empty [32]. The current density is given by (2):

$$J_\Omega = q \cdot p_o \cdot \mu \cdot \frac{V}{d}. \qquad (2)$$

Here q is the electronic charge, μ is the charge mobility, p_o is the free carrier density, d is the film thickness and V is the applied voltage.

The slope value is approximately 1.6 at medium voltage in the case of our zinc porphyrin complex, where the voltage follows the power law dependence (I–V), which is related to the space-charge limited current mechanism (SCLC). Moreover, the density of the injected charges from electrodes increases. Since the applied voltage passes through the transition voltage $V = 0.53$ V, the density of the injected charges will dominate the transport capacity of the $[Zn(TFMPP)(4,4'\text{-bipy})]\cdot(4,4'\text{-bipy})\cdot 2H_2O$ layer. In this regime, the current density varies following equation (3):

$$J_{SCLC} = \frac{9}{8}\varepsilon \cdot \mu_{eff} \cdot \frac{V^2}{d^3}. \qquad (3)$$

Here ε is the material permittivity (assumed to be $4\varepsilon_o$, where ε_o is the vacuum permittivity) and μ_{eff} is the effective carrier mobility equal to $\theta\mu$-θ, which is the free charge fraction with $\theta = p/(p + p_t)$. Parameters p and p_t represent the free and trapped charge-carrier densities, respectively; d is the film thickness and V is the applied voltage.

According to the SCLC model (3), μ_{eff} for the film containing complex (I) was calculated with a value of 0.45 (10^{-5} cm^2/Vs). This result is comparable to the literature value of about 10^{-5} cm^2/Vs for the 2,7-distyrylcarbazole p-type species [33–35].

Plan of the talk

Centre Mersenne: On-going projects

- Full-text for maths articles: LaTeX → HTML online. Should be available by the end of 2024.
- Semi-automatic translation of articles: an online interface enabling scientists or professional translators to translate automatically and post-edit articles of the *Compte Rendus de l'Académie des sciences*. Available already for chemistry, biology, earth sciences, see next slide. Will be extended to maths, mechanics, physics as soon as articles in HTML format available.
- Comments online: platform enabling authentified scientists to post comments on articles for the *Comptes Rendus de l'Académie des sciences*.

Semi-automatic translation: focus on the project

Project sponsored by the French Ministry of Higher Education and Research and the French Ministry of Culture. Two-fold objective:

- Establishing a bilingual scientific corpus that could be utilized as a dataset to train an AI;
- Developing a comprehensive computer-assisted translation software set up on the publication website of the *Comptes Rendus de l'Académie des sciences*.

Features

- Principle: machine translation via DeepL possible, and systematically followed by human voluntary or professionnal post-editing of articles.
- Pivot format: HTML.
- Publication of the translation in PDF (via an intermediate LaTeXformat) and HTML with a CC-BY licence next to the original work.

Means: 1 professional translator and 1 IT developer during 12 months, 1 freelance translator, + Mersenne staff

Outcome after 12 months: 25 articles translated and the interface being tested on a test site.

Main difficulty overcomed: math formulas are usually not handled by computer-assisted translation softwares.

Figure: Authentification, automatic translation then human post-editing

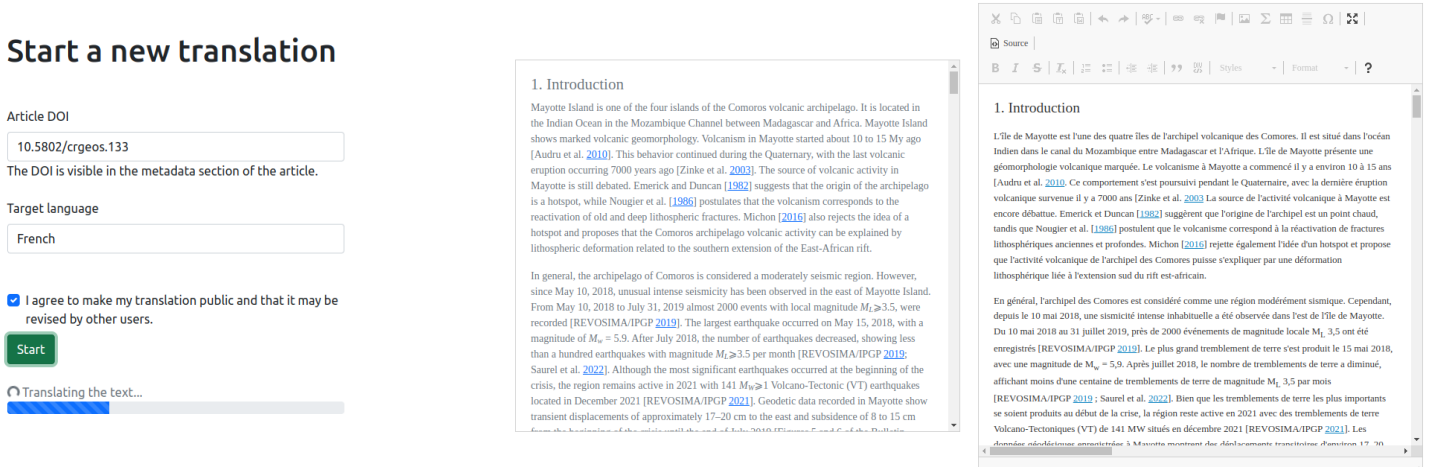
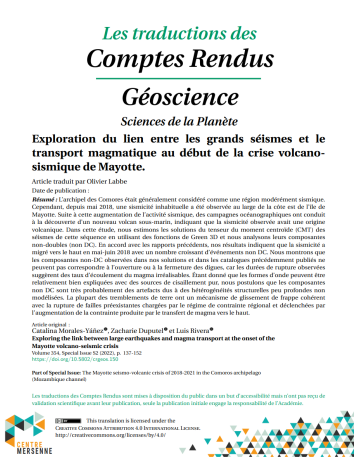


Figure: Compilation, cover sheet and publication



Conclusion: Main challenges for the centre Mersenne

- Face the increasing volume of publication since 2018.
- Adapt to new editorial practices because new scientific disciplines involved $\rightsquigarrow$ specific adaptations on OJS and on the platform.
- Adapt our platform to new formats (not all the journals in LaTeX).
- Develop efficient and ethical services (semi-automatic translation, full-text...). Improve quality, and avoid relying on bibliometric indicators.
- Achieve the administrative and financial procedures and contracts taking into account the public administration constraints.
- Hire and form people, minimize the outsourcing for typesetting.
- Convince the community that the centre Mersenne is a nice, reliable and long-term publishing solution to create or to flip journals in open access.

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Thanks!

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A quotation (Baillet, 1691)

> ''*Mersenne s'etoit rendu comme le centre de tous les gens de lettres par le commerce continuel qu'il entretenoit avec tous, et tous avec luy. C'etoit a luy qu'ils envoyoient leurs doutes et leurs difficultez pour etre proposees par son moyen a ceux dont on attent les solutions ; et lorsqu'il les avoit reçues, il les leur renvoyoit faisant a peu pres dans le corps de toute la republique des Lettres la fonction que fait le coeur dans le corps humain a l'egard du sang.* [...] *Les Italiens le regardoient aussi bien que nous comme le grand negociant des Lettres, qui fournissoit les provisions aux autres, et qui scavoit exiger d'eux ce qu'ils etoient capables de produire.*''

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> *"Mersenne was like the center of all scholars by the continual commerce he maintained with all, and all with him. It was to him that they sent their doubts and their difficulties to be proposed by his means to those whose solutions were awaited; and when he had received them, he sent them back to them, having almost in the body of the whole Republic of Letters the function which the heart makes in the human body with regard to blood. The Italians regarded him, as we do, as the great mediator of the Letters, who furnished provisions to others, and was able to demand of them what they were capable of producing."*

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A portrait

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