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Publications 2023
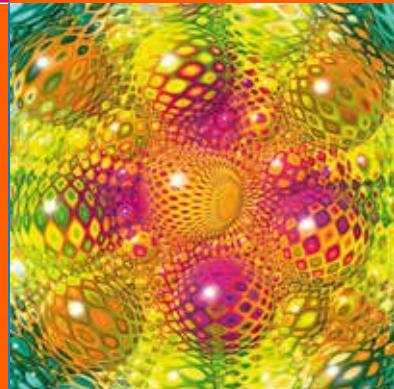
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Books series

For the convenience of the reader, this catalog is in English apart from the series titles and descriptions of the books written in French.

ASTÉRISQUE

Astérisque *is a book series of high level. It covers the whole field of mathematics. Apart from Bourbaki seminars, which survey very recent results that appeared elsewhere, it publishes original works and is aimed at specialists.* *(ISSN 0303-1179)*

Scientific Board: M.-C. Arnaud, C. Breuil, **N. Burq**, P. Eyssidieux, C. Guillarmou, F. Kassel, E. Moulines, A. Oancea, N. Ressayre, R. Rhodes, S. Serfaty, S. Woo Shin.

Vol. 438
Séminaire Bourbaki, volume 2021-2022, exposés 1181-1196

ISBN 978-85629-968-5
2022 - 598 pages - Softcover. 17 x 24
Public: 81 € - Members: 57 €

Ce 73e volume du Séminaire Bourbaki contient les textes des seize exposés présentés pendant l'année 2021/2022 : groupes de surface dans les réseaux des groupes de Lie, non-densité des points entiers et variations de structures de Hodge, flots de Ricci et difféomorphismes de variétés de dimension 3, structure des espaces limites des variétés non effondrées, classification des couplages invariants, conjecture de Shelah et théorème de Johnson, graphes expanseurs en dimension supérieure, trous spectraux non linéaires et applications, rigidité locale du spectre des longueurs marquées, problème de sous-convexité pour les fonctions L, équation de Schrödinger non linéaire, conjecture de Kannan-Lovász-Simonovits, problèmes additifs binaires pour les polynômes sur les corps finis, mesures cristallines, conjecture du $K(\pi,1)$ pour les groupes d'Artin affines, ensembles sans progression arithmétique de longueur trois.
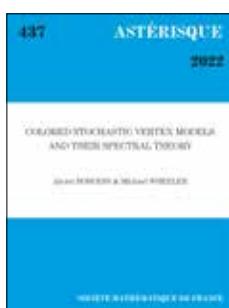
Vol. 437
Coloured stochastic vertex models and their spectral theory
A. BORODIN, M. WHEELER

ISBN 978-2-85629-963-0
2022 - 225 pages - Softcover. 17 x 24
Public: 49 € - Members: 34 €

This work is is dedicated to Sl_{n+1}-related integrable stochastic vertex models; we call such models coloured. We prove several results about these models, which include the following:

1. We construct the basis of (rational) eigenfunctions of the coloured transfer-matrices as partition functions of our lattice models with certain boundary conditions. Similarly, we construct a dual basis and prove the corresponding orthogonality relations and Plancherel formulae.

2. We derive a variety of combinatorial properties of those eigenfunctions, such as branching rules, exchange relations under Hecke divided-difference operators, (skew) Cauchy identities of different types, and monomial expansions.

3.We show that our eigenfunctions are certain (non-obvious) reductions of the nested Bethe Ansatz eigenfunctions.

4. For models in a quadrant with domain-wall (or half-Bernoulli) boundary conditions, we prove a matching relation that identifies the distribution of the coloured height function at a point with the distribution of the height function along a line in an associated colour-blind (Sl_2-related) stochastic vertex model. Thanks to a variety of known results about asymptotics of height functions of the colour-blind models, this implies a similar variety of limit theorems for the coloured height function of our models.

5. We demonstrate how the coloured/uncoloured match degenerates to the coloured (or multi-species) versions of the ASEP, q-PushTASEP, and the q-boson model.

6. We show how our eigenfunctions relate to non-symmetric Cherednik-Macdonald theory, and we make use of this connection to prove a probabilistic matching result by applying Cherednik--Dunkl operators to the corresponding non-symmetric Cauchy identity.
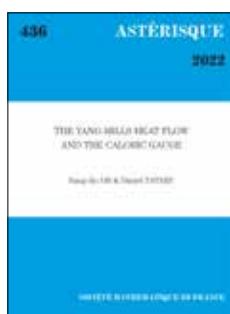
Vol. 436
The Yang-Mills heat flow and the caloric gauge
S.-J. Oh, D. Tataru

ISBN 978-2-85629-961-6
2022 - 132 pages - Softcover. 17 x 24
Public: 38 € - Members: 27 €

This is the first part of the four-paper sequence, which establishes the Threshold Conjecture and the Soliton Bubbling vs.~Scattering Dichotomy for the hyperbolic Yang-Mills equation in the (4 + 1)-dimensional Minkowski space-time.
The primary subject of this paper, however, is another PDE, namely the energy critical Yang-Mills heat flow on the 4-dimensional Euclidean space. Our first goal is to establish sharp criteria for global existence and asymptotic convergence to a flat connection for this system, including the Dichotomy Theorem and the Threshold Theorem.
Our second goal is to use the Yang-Mills heat flow in order to define the caloric gauge, which will play a major role in the analysis of the hyperbolic Yang-Mills equation in the subsequent papers.

Vol. 435
Parabolic Hecke eigensheaves
R. Donagi, T. Pantev

ISBN 978-2-85629-960-9
2022 - 192 pages - Softcover. 17 x 24
Public: 50 € - Members: 35 €

We study the Geometric Langlands Conjecture (GLC) for rank two flat bundles on the projective line C with tame ramification at five points {p1,p2,p3,p4,p5}.
In particular we construct the automorphic *D*-modules predicted by GLC on the moduli space of rank two parabolic bundles on *(C,*{p1,p2,p3,p4,p5}*)*.
The construction uses non-abelian Hodge theory and a Fourier-Mukai transform along the fibers of the Hitchin fibration to reduce the problem to one in classical projective geometry on the intersection of two quadrics in P^4.

Vol. 434
Heegner points, stark-Heegner points, and diagonal classes
M. Bertolini, H. Darmon, V. Rotger, M. A. Seveso, R. Venerucci

ISBN 978-2-85629-959-3
2022 - 228 pages - Softcover. 17 x 24
Public: 49 € - Members: 34 €

This volume comprises four interrelated articles whose unifying theme is the study of Heegner and Stark-Heegner points, and their connections with the padic logarithm of certain global cohomology classes attached to a pair of weight one theta series of a common (imaginary or real) quadratic field.
These global classes are obtained from p-adic deformations of diagonal classes attached to triples of modular forms of weight > 1, and naturally generalise a construction of Kato which one recovers when the two theta series are replaced by Eisenstein series of weight one. Understanding the extent to which such classes obtained via the p-adic interpolation of motivic cohomology classes are themselves motivic is a key motivation for this study.
A second is the desire to show that Stark-Heegner points, whose global nature is still poorly understood theoretically, arise from classes in global Galois cohomology.

Vol. 433
Triangulated categories of logarithmic motives over a field
F. Binda, D. Park, P. A. Ostvaer

In this work we develop a theory of motives for logarithmic schemes over fields in the sense of Fontaine, Illusie, and Kato. Our construction is based on the notion of finite log correspondences, the dividing Nisnevich topology on log schemes, and the basic idea of parameterizing homotopies by $\overline{\square}$, i.e. the projective line with respect to its compactifying logarithmic structure at infinity. We show that Hodge cohomology of log schemes is a $\overline{\square}$-invariant theory that is representable in the category of logarithmic motives. Our category is closely related to Voevodsky's category of motives and A^1-invariant theories: assuming resolution of singularities, we identify the latter with the full subcategory comprised of A^1-local objects in the category of logarithmic motives. Fundamental properties such as $\overline{\square}$-homotopy invariance, Mayer-Vietoris for coverings, the analogs of the Gysin sequence and the Thom space isomorphism as well as a blow-up formula and a projective bundle formula witness the robustness of the setup.

Vol. 432
A theory of dormant opers on pointed stable curves
Y. Wakabayashi

This manuscript presents a detailed and original account of the theory of opers defined on pointed stable curves in arbitrary characteristic and their moduli. In particular, it includes the development of the study of dormant opers, which are opers of a certain sort in positive characteristic. Our goal is to give an explicit formula, conjectured by Joshi, for the generic number of dormant opers.

Vol. 431
Geometric local ε-factors
Q. Quignard

Inspired by the work of Laumon on local ε-factors and by Deligne's 1974 letter to Serre, we give an explicit cohomological definition of ε-factors for ℓ-adic Galois representations over henselian discrete valuation fields of positive equicharacteristic p≠ℓ, with (not necessarily finite) perfect residue fields. These geometric local ε-factors are completely characterized by an explicit list of purely local properties, such as an induction formula and the compatibility with geometric class field theory in rank 1, and satisfy a product formula for ℓ-adic sheaves on a curve over a perfect field of characteristic p.

Vol. 430
Séminaire Bourbaki, volume 2019-2021, exposés 1166-1180

Ce 72e volume du Séminaire Bourbaki contient les textes des quinze exposés de survol présentés entre novembre 2019 et juin 2021 : conjecture de l'entropie positive d'Herman, estimations pseudo-spectrales et stabilité des tourbillons, lemme de fermeture C∞, pseudospectre et résolvantes d'opérateurs non autoadjoints, théorie de Hodge et o-minimalité, forçage des homéomorphismes de surfaces, ensembles nodaux de fonctions propres du laplacien, phénomènes de type Ratner dans les variétés hyperboliques, théorème inverse pour les normes de Gowers, reconstruction d'une variété algébrique à partir de sa topologie, valeurs spéciales de la fonction zêta de Riemann et polylogarithmes, principe d'incertitude fractal, sous-variétés totalement géodésiques de l'espace de modules de courbes, dénombrement asymptotique de surfaces minimales dans les variétés hyperboliques, logique continue et propriété (T) des groupes Roelcke-précompacts.

Vol. 429

Percolation on uniform quadrangulations and SLE$_6$ on √8/3-Liouville quantum gravity

E. Gwynne et J. Miller

We show that the percolation exploration path for critical (p=3/4) face percolation on a uniform random quadrangulation with simple boundary converges in the scaling limit to a certain curve-decorated metric measure space. Explicitly, the limiting object is SLE$_6$ on a √8/3-Liouville quantum gravity (LQG) disk, or equivalently SLE$_6$ on the Brownian disk. The topology of convergence is the natural analog of the Gromov-Hausdorff topology for curve-decorated metric measure spaces. We also obtain analogous results for site percolation on a uniform triangulation with simple boundary. We expect that our techniques can be generalized to other variants of percolation on uniform random planar maps. Our proof proceeds by showing tightness of our percolation-decorated random quadrangulation, then showing that every possible subsequential limit must be SLE$_6$ on √8/3-LQG. To carry out this second step, we prove that SLE$_6$ on a √8/3-LQG surface is uniquely characterized by a list of simple properties, then check that the subsequential limit must satisfy these properties. The discrete part of the argument (involving random planar maps) is carried out in the first article of this volume, in which we show tightness and check the hypotheses of the characterization theorem. The continuum part of the argument (involving SLE and LQG) is carried out in the second article, in which we prove the characterization theorem for SLE$_6$ on √8/3-LQG. We also establish analogous characterization theorems for SLE$_\kappa$ on γ-LQG surfaces for any κ ∈ (4,8) and γ = 4/√κ ∈ (√2, 2), which we expect may be useful for proving scaling limit results for other statistical mechanics models on random planar maps.

Vol. 428

Automorphic cohomology, motivic cohomology, and the adjoint L-function

K. Prasanna et A. Venkatesh

We propose a relationship between the cohomology of arithmetic groups, and the motivic cohomology of certain (Langlands-)attached motives. The motivic cohomology group in question is that related, by Beilinson's conjecture, to the adjoint L-function at s=1. We present evidence for the conjecture using the theory of periods of automorphic forms, and using analytic torsion.

Vol. 427

Liouville quantum gravity as a mating of trees
B. Duplantier, J. Miller, S. Sheffield

There is a simple way to "glue together" a coupled pair of continuum random trees (CRTs) to produce a topological sphere. The sphere comes equipped with a measure and a space-filling curve (which describes the "interface" between the trees). We present an explicit and canonical way to embed the sphere in C∪{∞}. In this embedding, the measure is a form of Liouville quantum gravity (LQG) with parameter γ ∈ (0,2), and the curve is space-filling SLE$_\kappa$ with κ'=16/γ^2. Achieving this requires us to develop an extensive suite of tools for working with LQG surfaces. We explain how to conformally weld so-called "quantum wedges" to obtain new quantum wedges of different weights. We construct finite-volume quantum disks and spheres of various types, and give a Poissonian description of the set of quantum disks cut off by a boundary-intersecting SLE$_\kappa$(ρ) process with κ ∈ (0,4). We also establish a Lévy tree description of the set of quantum disks to the left (or right) of an SLE$_{\kappa'}$ with κ' ∈ (4,8). We show that given two such trees, sampled independently, there is a.s.a canonical way to "zip them together" and recover the SLE$_{\kappa'}$. The law of the CRT pair we study was shown in an earlier paper to be the scaling limit of the discrete tree/dual-tree pair associated to an FK-decorated random planar map (RPM). Together, these results imply that FK-decorated RPM scales to CLE-decorated LQG in a certain "tree structure" topology.
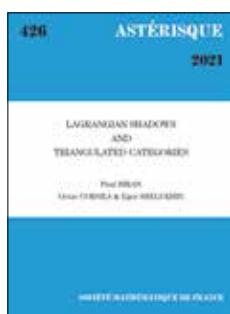
Vol. 426

Lagrangian shadows and triangulated categories

P. Biran, O. Cornea, E. Shelukhin

We introduce new metrics on spaces of Lagrangian submanifolds, not necessarily in a fixed Hamiltonian isotopy class. Our metrics arise from measurements involving Lagrangian cobordisms. We also show that splitting Lagrangians through cobordism has an energy cost and, from this cost being smaller than certain explicit bounds, we deduce some forms of rigidity of Lagrangian intersections. We also fit these constructions in the more general algebraic setting of triangulated categories, independent of Lagrangian cobordism. As a main technical tool, we develop aspects of the theory of (weakly) filtered A∞-categories.

Vol. 425

Norms in motivic homotopy theory

Tom Bachmann, Marc Hoyois

If $f:S'\to S$ is a finite locally free morphism of schemes, we construct a symmetric monoidal « norm » functor $f_\otimes : H_\cdot(S')\to H_\cdot(S)$, where $H_\cdot(S)$ is the pointed unstable motivic homotopy category over S. If f is finite étale, we show that it stabilizes to a functor $f_\otimes : SH(S')\to SH(S)$, where $SH(S)$ is the P^1-stable motivic homotopy category over S. Using these norm functors, we define the notion of a normed motivic spectrum, which is an enhancement of a motivic E_∞-ring spectrum. The main content of this text is a detailed study of the norm functors and of normed motivic spectra, and the construction of examples. In particular: we investigate the interaction of norms with Grothendieck's Galois theory, with Betti realization, and with Voevodsky's slice filtration; we prove that the norm functors categorify Rost's multiplicative transfers on Grothendieck-Witt rings; and we construct normed spectrum structures on the motivic cohomology spectrum HZ, the homotopy K-theory spectrum KGL, and the algebraic cobordism spectrum MGL. The normed spectrum structure on HZ is a common refinement of Fulton and MacPherson's mutliplicative transfers on Chow groups and of Voevodsky's power operations in motivic cohomology.
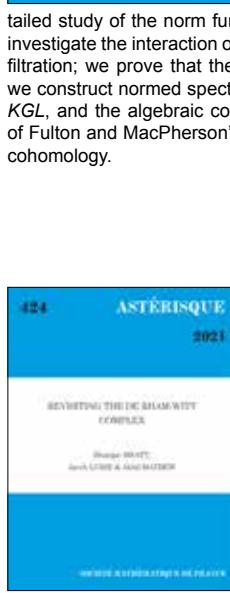
Vol. 424

Revisiting the de Rham-Witt complex

B. Bhatt, J. Lurie, A. Mathew

The goal of this paper is to offer a new construction of the de Rham-Witt complex of a smooth variety over a perfect field of characteristic $p>0$. We introduce a category of cochain complexes which are equipped with an endomorphism F of underlying graded abelian groups satisfying $dF=pFd$, whose homological algebra we study in detail. To any such object satisfying an abstract analog of the Cartier isomorphism, an elementary homological process associates a generalization of the de Rham-Witt construction. Abstractly, the homological algebra can be viewed as a calculation of the fixed points of the Berthelot-Ogus operator $L\eta p$ on the p-complete derived category. We give various applications of this approach, including a simplification of the crystalline comparison for the $A\Omega$-cohomology theory introduced in a paper written by B. Bhatt, M. Morrow and P. Scholze.

ASTÉRISQUE

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MÉMOIRES

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Vol. 175
On the pro-p Iwahori Hecke Ext-algebra of $SL_2(Q_p)$
P. SCHNEIDER, R. OLLIVIER

ISBN 978-2-85629-944-9
2022 - 114 pages - Softcover. 17 x 24
Public: 38 € - Members: 27 €

Let $G=SL_2(F)$ where F is a finite extension of Q_p. We suppose that the pro-p Iwahori subgroup I of G is a Poincaré group of dimension d. Let k be a field containing the residue field of F In this article, we study the graded Ext-algebra $E^*=Ext^*_{Mod(G)}(k[G/I],k[G/I])$. Its degree zero piece E^0 is the usual pro-p Iwahori-Hecke k-algebra H. We study E^d as an H-bimodule and deduce that for an irreducible admissible smooth k-representation V of G, we have $H^d(I,V)=0$ unless V is the trivial representation. When $F=Qp$ with $p≥5$, we have $d=3$. In that case we describe E^* as an H-bimodule and give the structure as an algebra of the centralizer in E^* of the center of H. We deduce results on the values of the functor $H^*(I,−)$ which attaches to a (finite length) smooth k-representation V of G its cohomology with respect to I. We prove that $H^*(I,V)$ is always finite dimensional. Furthermore, if V is irreducible, then V is supersingular if and only if $H^*(I,V)$ is a supersingular H-module.

Vol. 174
Constructive and destructive interferences in nonlinear hyperbolic equations
R. CARLES, C. CHEVERRY

ISBN 978-2-85629-946-3
2022 - 110 pages - Softcover. 17 x 24
Public: 43 € - Members: 31 €

This article introduces a physically realistic model for explaining how electromagnetic waves can be internally generated, propagate and interact in strongly magnetized plasmas or in nuclear magnetic resonance experiments. It studies high frequency solutions of nonlinear hyperbolic equations for time scales at which dispersive and nonlinear effects can be present in the leading term of the solutions. It explains how the produced waves can accumulate during long times to produce constructive and destructive interferences which, in the above contexts, are part of turbulent effects.

Vol. 173
On mod p local-global compatibility for GLn(Qp) in the ordinary case
C. PARK, Z. QIAN

ISBN 978-2-85629-945-6
2022 - 150 pages - Softcover. 17 x 24
Public: 43 € - Members: 31 €

Let p be a prime number, $n>2$ an integer, and F a CM field in which p splits completely. Assume that a continuous automorphic Galois representation $\bar{r} : Gal(\overline{Q}/F) \rightarrow GL_n(\overline{F}_p)$ is upper-triangular and satisfies certain genericity conditions at a place w above p, and that every subquotient of $\bar{r}|_{Gal(\overline{Q}p/Fw)}$ of dimension >2 is Fontaine-Laffaille generic. In this paper, we show that the isomorphism class of $\bar{r}|_{Gal(\overline{Q}p/Fw)}$ is determined by $GLn(F_w)$-action on a space of mod p algebraic automorphic forms cut out by the maximal ideal of a Hecke algebra associated to $\bar{r}$. In particular, we show that the wildly ramified part of $\bar{r}|_{Gal(\overline{Q}p/Fw)}$ is determined by the action of Jacobi sum operators (seen as elements of $Fp[GL_n(F_p)])$ on this space.

Vol. 172

Asymptotic properties of small data solutions of the Vlasov-Maxwell system in high dimensions

L. Bigorgne

We prove almost sharp decay estimates for the small data solutions and their derivatives of the Vlasov-Maxwell system in dimension n≥4. The smallness assumption concerns only certain weighted L^1 or L^2 norms of the initial data. In particular, no compact support assumption is required on the Vlasov or the Maxwell fields. The main ingredients of the proof are vector field methods for both the kinetic and the wave equations, null properties of the Vlasov-Maxwell system to control high velocities and a new decay estimate for the velocity average of the relativistic massive transport equation. We also consider the massless Vlasov-Maxwell system under a lower bound on the velocity support of the Vlasov field. As we prove in this paper, the velocity support of the Vlasov field needs to be initially bounded away from 0. We compensate the weaker decay estimate on the velocity average of the massless Vlasov field near the light cone by an extra null decomposition of the velocity vector.

Vol. 171

On the evolution by duality of domains on manifolds

K. Coulibaly-Pasquier, L. Miclo

On a manifold, consider an elliptic diffusion X admitting an invariant measure μ. The goal of this paper is to introduce and investigate the first properties of stochastic domain evolutions $(D_t)_{t \in [0, \tau]}$ which are intertwining dual processes for X (where τ is an appropriate positive stopping time before the potential emergence of singularities). They provide an extension of Pitman's theorem, as it turns out that $(\mu(D_t))_{t \in [0, \tau]}$ is a Bessel-3 process, up to a natural time-change. When X is a Brownian motion on a Riemannian manifold, the dual domain-valued process is a stochastic modification of the mean curvature flow to which is added an isoperimetric ratio drift to prevent it from collapsing into singletons.

Vol. 170

Espaces de configuration généralisés - Espaces topologiques i-acycliques - Suites spectrales basiques

A. Arabia

Ce mémoire présente une nouvelle approche pour l'étude de la cohomologie à supports compacts des espaces de configuration généralisés pour les espaces localement compacts M. L'approche comporte deux volets. Le premier s'applique uniquement aux espaces i-acycliques, dont la classe contient les espaces contractiles non compacts, et, si X est i-acyclique, contient aussi les ouverts de X et les produits $X \times M$ par tout espace M. Le deuxième volet décrit un procédé qui permet l'extrapolation des propriétés cohomologiques des espaces de configuration pour les espaces i-acycliques X aux espaces topologiques généraux M. Comme application du procédé, les théorèmes de stabilité de représentations connus pour les familles $\{F_m (M)\}_m$ où M est une variété topologique, sont généralisés aux familles $D_?(a) := \{\alpha_{?m}\text{-a}M^m\}_{m \geq a}$, où M est une pseudovariété. En particulier, les variétés algébriques complexes, qu'elles soient lisses on non, vérifient ces généralisations.

Vol. 169
Hydrodynamic Limit for an Active Exclusion Process
C. Erignoux

Collective dynamics can be observed among many animal species, and have given rise in the last decades to an active and interdisciplinary field of study. Such behaviors are often modeled by active matter, in which each individual is self-driven and tends to update its velocity depending on the one of its neighbors. In a classical model introduced by Vicsek & al., as well as in numerous related active matter models, a phase transition between chaotic behavior at high temperature and global order at low temperature can be observed. Even though ample evidence of these phase transitions has been obtained for collective dynamics, from a mathematical standpoint, such active systems are not fully understood yet. Significant progress has been achieved in the recent years under an assumption of mean-field interactions, however to this day, few rigorous results have been obtained for models involving purely local interactions. In this paper, as a first step towards the mathematical understanding of active microscopic dynamics, we describe a lattice active particle system, in which particles interact locally to align their velocities. We obtain rigorously, using the formalism developed for hydrodynamic limits of lattice gases, the scaling limit of this out-of-equilibrium system. This article builds on the multi-type exclusion model introduced by Quastel by detailing his proof and incorporating several generalizations, adding significant technical and phenomenological difficulties.

Vol. 168
Stable Formality Quasi-isomorphisms for Hochschild Cochains
V. A. Dolgushev

We consider L∞-quasi-isomorphisms for Hochschild cochains whose structure maps admit "graphical expansion". We introduce the notion of stable formality quasi-isomorphism which formalizes such an L∞-quasi-isomorphism. We define a homotopy equivalence on the set of stable formality quasi-isomorphisms and prove that the set of homotopy classes of stable formality quasi-isomorphisms form a torsor for the group corresponding to the zeroth cohomology of the full (directed) graph complex. This result may be interpreted as a complete description of homotopy classes of formality quasi-isomorphisms for Hochschild cochains in the "stable setting".

Vol. 167
P-adic heights and p-adic Hodge theory
D. Benois

Using the theory of (Φ,γ)-modules and the formalism of Selmer complexes we construct the p-adic height pairing for p-adic representations with coefficients in an affinoid algebra over Q_p. For p-adic representations that are potentially semistable at p, we relate our contruction to universal norms and compare it to the p-adic height pairings of Nekovàr and Perrin-Riou.

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*The series **Panoramas et Synthèses** is designed to introduce non-specialist mathematicians to new developments of contemporary mathematical research, with a special focus on the quality of exposition.*

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Vol. 58
Teichmüller theory and dynamics
P. DEHORNOY & E. LANNEAU (eds.)
ISBN 978-2-85629-966-1
2022 - 162 pages - Softcover. 17 x 24
Public: 43 € - Members: 30 €

This edition of Panoramas & Synthèses follows the 27th edition of the summer School in mathematics, focussed on Teichmüller dynamics, mapping class groups and applications. It took place from 11 to 22 June 2018 at the Institut Fourier (UMR CNRS 5582) of Grenoble. During this school, twelve specialists came to present the basics of the theory of translation surfaces and their moduli spaces, as well as the recent advances in the field. This volume brings together four texts, all based on the lecture notes of the school, and illustrates the interaction between Teichmüller theory and dynamics.

Vol. 57
### Topics in statistical learning theory
P. L. BARTLETT, S. DASGUPTA

ISBN 978-2-85629-964-7
2022 - 89 pages - Softcover. 17 x 24
Public: 38 € - Members: 27 €

This volume is the outcome of a series of three lectures on statistical learning theory given at Institut Henri Poincaré in 2011 under the auspices of the Société Mathématique de France. The introductory chapter provides an overview of the history of Statistical Learning Theory, its roots, its mathematical tools and the questions that make it. The chapter "Algorithms for minimally supervised learning" by Sanjoy Dasgupta describes the progress of theoretical computer science on the issues of unsupervised learning (clustering) and active learning. Surprisingly, much of this progress is due to the confrontation of measurement concentration theory, complexity theory and established practices in numerical statistics. The chapter "Online prediction" by Peter Bartlett focuses on online learning. It is a confrontation between statistics, game theory and optimization.

Vol. 56
Hyperbolicity properties of algebraic varieties
B. CLAUDON, P. CORVAJA, J.-P. DEMAILLY, S. DIVERIO, J. DUVAL, C. GASBARRI, S. KEBEKUS, M. PAUN, E. ROUSSEAU, N. SIBONY, B. TAJI, C. VOISIN (edited by S. DIVERIO)

ISBN 978-2-85629-951-7
2021 - 388 pages - Softcover. 17 x 24
Public: 60 € - Members: 42 €

Since its introduction in the 70's, the notion of Kobayashi hyperbolicity has attracted a lot of attention in the mathematical community. Besides its aspects belonging to the several complex variables world, a fascinating theme is that of its interactions with the algebraic, arithmetic, and differential geometric properties of algebraic varieties. These interactions are essentially what this book is about and the issues addressed are: distribution and distribution of values of entire curves, algebraic analogues of hyperbolicity, hyperbolicity properties of projective hypersurfaces and of varieties of general type, hyperbolicity of moduli spaces, relationships between hyperbolicity and negative curvature, distribution of rational points on hyperbolic (arithmetic) varieties, and interplay of natural fibrations on algebraic varieties and hyperbolicity. The volume makes a point of the state of the art and tries to keep the language friendly enough to encourage PhD students as well as researchers in complex geometry to get into the study of hyperbolicity properties of algebraic varieties.
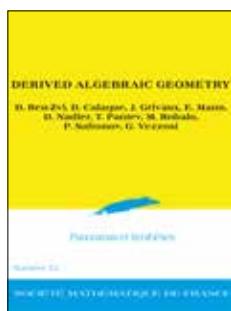
Vol. 55

Derived algebraic theory

D. Ben-Zvi, D. Calaque, J. Grivaux, É. Mann, D. Nadler, T. Pantev, M. Robalo, P. Safronov, G. Vezzosi

ISBN 978-2-85629-938-8
2021 - 230 pages - Softcover. 17 x 24
Public: 45 € - Members: 32 €

We give a quick introduction to derived algebraic geometry (DAG) sampling basic constructions and techniques. We discuss affine derived schemes, derived algebraic stacks, and the Artin-Lurie representability theorem. Through the example of deformations of smooth and proper schemes, we explain how DAG sheds light on classical deformation theory. In the last two sections, we introduce differential forms on derived stacks, and then specialize to shifted symplectic forms, giving the main existence theorems proved in ptvv.

Vol. 54

An excursion into p-Adic Hodge theory: from foundations to recents trends

F. Andreatta, R. Brasca, O. Brinon, X. Caruso, B. Chiarellotto, G. Freixas i Montplet, S. Hattori, N. Mazzari, S. Panozzo, M. Seveso, G. Yamashita
(edited by A. Mézard)

ISBN 978-2-85629-913-5
2019 - 284 pages - Softcover. 17 x 24
Public: 50 € - Members: 35 €

This volume offers a progressive and comprehensive introduction to p-adic Hodge theory. It starts with Tate's works on p-adic divisible groups and the cohomology of p-adic varieties, which constitutes the main concrete motivations for the development of p-adic Hodge theory. It then moves smoothly to the construction of Fontaine's p-adic period rings and their apparition in several comparison theorems between various p-adic cohomologies. Applications and generalizations of these theorems are subsequently discussed. Finally, Scholze's modern vision on p-adic Hodge theory, based on the theory of perfectoids, is presented.

Vol. 53

Advanced Topics in Random Matrices

F. Benaych-Georges, Ch. Bordenave, M. Capitaine, C. Donati-Martin, A. Knowles
(edited by F. Benaych-Georges, D. Chafaï, S. Péché, B. de Tilière)

ISBN 978-2-85629-850-3
2018 - 190 pages - Softcover. 17 x 24
Public: 45 € - Members: 32 €

This book provides three accessible panoramas and syntheses on advanced topics in random matrix theory:
- local semicircle law for Wigner matrices, and applications to eigenvectors delocalization, rigidity of eigenvalues, and fourth moment theorem;
- spectrum of random graphs, recent advances on eigenvalues and eigenvectors, and open problems;
- deformed random matrices and free probability, unified understanding of various asymptotic phenomena such as spectral measure description, localization and fluctuations of extremal eigenvalues, eigenvectors behavior.
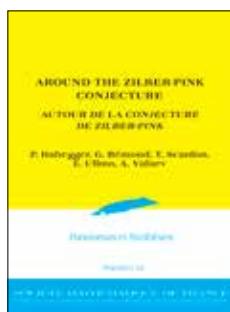
Vol. 52
Around the Zilber-Pink Conjecture
P. Habegger, G. Rémond, T. Scanlon, E. Ullmo and A. Yafaev

ISBN 978-2-85629-856-5
2017 - 284 pages - Softcover. 17 x 24
Public: 55 € - Members: 38 €

Following Faltings and Vojta's work proving the Mordell-Lang conjecture for abelian varieties and Raynaud's work proving the Manin-Mumford conjecture, many new Diophantine questions appeared, often described as problems of unlikely intersections. The arithmetic of moduli spaces of abelian varieties and more generally Shimura varieties has been parallely developed, around the central André-Oort conjecture. These two themes can be placed in a common frame - the Zilber-Pink conjecture. This volume proposes an introduction to these problems and to the various techniques used : geometry, height theory, reductive groups and Hodge theory, Shimura varieties, model theory via the notion of o-minimal structure. It contains texts corresponding to courses presented at CIRM, in May 2011, by Philipp Habegger, Gaël Rémond, Thomas Scanlon, Emmanuel Ullmo and Andrei Yafaev and an ample introduction by E. Ullmo, centered on the notion of bi-algebraicity, aiming at a presentation of the general setting.

Vol. 51
Real Algebraic Geometry
F. Mangolte, J.-P. Rolin, K. Kurdyka, S. Basu and V. Powers

ISBN 978-2-85629-857-2
2017 - 180 pages - Softcover. 17 x 24
Public: 45 € - Members: 32 €

We present an overview of the research in real algebraic geometry. An introduction and five survey articles compose this volume. The topics are: real rational surfaces, o-minimal geometry, analytic arcs and real analytic singularities, algorithms in real algebraic geometry, positive polynomials and sums of squares. This volume is addressed to a wide audience: students, young researchers in the field and also researchers non-experts in real algebraic geometry.

Vol. 50
Topics on Compressible Navier-Stokes Equations
A. Novotný, R. Danchin and M. Perepelitsa, edited by D. Bresch

ISBN 978-2-85629-847-3
2016 - 135 pages - Softcover. 17 x 24
Public: 40 € - Members: 28 €

This volume present the major actual mathematical developments related to the well-posedness character problem for the compressible Navier-Stokes equations to non-subject specialists. For the sake of unity, editors have decided to collect in this special issue contributions dedicated to the non-degenerate viscosities case, hoping by this way to present a self-contained contribution on the subject: global weak-solutions à la Leray, intermediate solutions à la Hoff and strong solutions in critical spaces à la Fujita-Kato.

PANORAMAS ET SYNTHÈSES

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PS46 - 2015 - 316 pages - Public: 56 € - Members: 39 €

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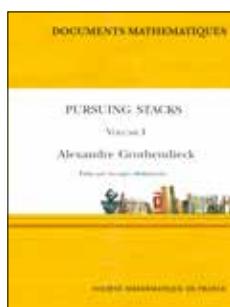
Vol. 20
Pursuing Stacks (volume I)
Alexandre GROTHENDIECK, édité par Georges MALTSINIOTIS

ISBN 978-2-85629-958-6
2022 - 446 pages - Hardcover. 17 x 24
Public: 75 € - Members: 53 €

Despite what its title suggests, Pursuing Stacks (or at least the part of the project that Grothendieck carried out under the name of The Modelizing Story or Histoire de Modèles) is not about the pursuit of stacks. Only the thirteen first sections, as well as, partially, sections 15–21 and 27, are about stacks. Furthermore, it is mainly about ∞-stacks on the point, i.e. weak ∞-groupoids. The only reflections on stacks on arbitrary topoi, as natural coefficients for a non-abelian cohomology, are purely heuristic. The rest of the hundred and forty sections deals with homotopy theory : the search for models for homotopy types (and more particularly for small categories whose presheaf category models canonically homotopy types : the test categories), homotopy structures, contractibility and asphericity structures, abelianization and schematization of homotopy types. Grothendieck was planning to come back later to ∞-stacks on topoi and to develop, in one or two additional volumes, what he had sketched out in his letters to Breen (letters that he included in Pursuing Stacks as an appendix), but he never did it. Nevertheless, the search for models for homotopy types is closely related to ∞-stacks, since according to the "homotopy hypothesis", a fundamental conjecture of Grothendieck, the weak ∞-groupoids model homotopy types.
The first volume of this edition consists of the first four chapters (sections 1–91 and 95–98). In a second volume, we will publish the last three chapters, the letters to Breen, as well as the correspondence of Grothendieck with several mathematicians, around the themes of Pursuing Stacks.
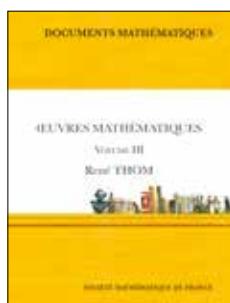
Vol. 19
Œuvres mathématiques de René Thom (volume III)

ISBN 978-2-85629-942-5
2022 - 691 pages - Hardcover. 17 x 24
Public: 85 € - Members: 60 €

Ce dernier volume des œuvres mathématiques complètes de René Thom contient le cours Fermi *Modèles mathématiques de la morphogénèse* donné à l'École normale supérieure de Pise en 1971, suivi d'articles publiés de 1972 à 1997, le tout assorti d'inédits et de commentaires mettant l'ensemble en perspective. Comme le précédent, ce volume III inclut des textes où des mathématiques très novatrices et leurs applications s'imbriquent avec une grande richesse. Beaucoup d'entre eux reflètent l'extraordinaire succès de la théorie des catastrophes dans les années soixante-dix. Le volume commence par une bibliographie mise à jour des œuvres de Thom, mathématiques ou non.

Vol. 18
### Rational Points on Curves over finite fields

J-P. Serre, with contributions by E. Howe, J. Oesterlé and C. Ritzenthaler

ISBN 78-2-85629-923-4
2020 (réimpression 2022) - 188 pages - Hardcover. 17 x 24
Public: 45 € - Members: 32 €

In 1985, Jean-Pierre Serre gave a series of lectures at Harvard University on the number of points of curves over finite fields. Based on notes taken at that time by F. Q. Gouvêa, the present revised and completed document provides an insightful introduction to this beautiful topic and to most of the ideas that have been developed in this area during the last 30 years.
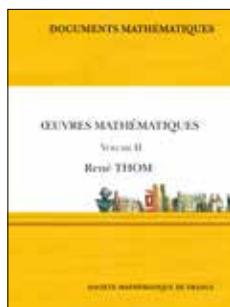
Vol. 17
Œuvres mathématiques de René Thom (Volume II)

ISBN 978-2-85629-888-6
2019 - 630 pages - Hardcover. 17 x 24
Public: 75 € - Members: 53 €

Ce deuxième volume des œuvres mathématiques complètes de René Thom contient le cours sur les singularités donné à Bonn en 1959, puis les articles publiés entre 1962 et 1971, assortis d'inédits et de commentaires mettant le tout en perspective. L'impression-nante contribution de Thom à la classification topologique des singularités d'applications différentiables et à la théorie des ensembles stratifiés figure pour l'essentiel ici. On y trouve aussi les articles fondateurs sur les catastrophes, avant la mode et les polémiques des années soixante-dix - les commentaires devraient aider à y voir plus clair. Le volume commence par une bibliographie des œuvres de Thom, mathématiques ou non.
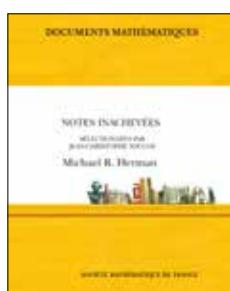
Vol. 16
### Notes inachevées sélectionnées par J.-C. Yoccoz
M. R. Herman

ISBN 978-2-85629-867-1
2018 - 200 pages - Hardcover. 17 x 24
Public: 50 € - Members: 35 €

Michel Herman était un spécialiste de premier plan de la théorie des systèmes dyna-miques. À sa disparition soudaine, il a laissé un grand nombre de notes manuscrites, dont certaines de grande qualité qui n'ont jamais été publiées. Jean-Christophe Yoccoz, son exécuteur testamentaire scientifique, qui était aussi un de ses premiers étudiants et un des interlocuteurs mathématiques les plus proches de son cœur, a eu l'idée de rassembler les plus importantes de ces notes et de les rendre disponibles pour la communauté. À cette fin, il a réuni une équipe de spécialistes dans les divers domaines de recherche de M. Herman qui ont uni leurs forces pour classer, examiner et saisir une sélection de ces notes. La ligne directrice de ce travail collectif était d'adhérer le plus possible au manuscrit original, en y ajoutant si nécessaire quelques corrections ou commentaires pour en faciliter la lecture. Le résultat est ce volume de notes non publiées à travers lesquelles nous espérons que le lecteur pourra découvrir ou re-découvrir certains aspects de la pensée mathématique de Michel Herman, de ses centres d'intérêt et de sa façon de conduire ses recherches.
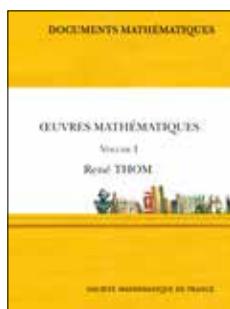
Vol. 15
## Œuvres mathématiques de René Thom (Volume I)

ISBN 978-2-85629-816-9
2017 (réimpression 2022) - 573 pages - Hardcover. 17 x 24
Public: 78 € - Members: 55 €

Le premier volume des œuvres mathématiques complètes de René Thom contient les articles publiés avant 1960, assortis d'inédits passionnants et de commentaires les mettant en perspective. La contribution de Thom à la topologie algébrique et différentielle, née au contact d'Henri Cartan et de Charles Ehresmann et qui valut à son auteur la médaille Fields en 1958, figure pour l'essentiel ici. Viennent ensuite les articles fondateurs sur les singularités, qui seront poursuivis dans les années soixante et donneront naissance à la théorie des catastrophes.
Le volume commence par une biographie substantielle et une bibliographie des œuvres de Thom, mathématiques ou non.
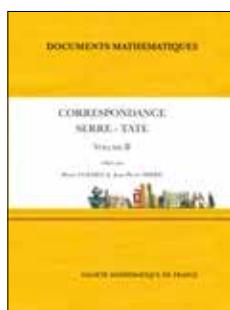
Vol. 13 & vol. 14
Correspondance Serre-Tate (volumes I & II)
éditée par P. Colmez et J-P. Serre

ISBN 978-85629-802-2 ; ISBN 978-85629-803-9
2015 - 969 pages - Hardcover. 17 x 24
Public: 80 € - Members: 56 € (each)
Public: 140 € - Members: 98 € (two volumes) - ISBN 978-85629-808-4

Ces deux volumes reproduisent, avec notes et commentaires, la correspondance entre Jean-Pierre Serre et John Tate de 1956 à 2000. Ils contiennent également un choix de mels postérieurs à l'année 2000.
Les textes sont reproduits dans leur langue originale : tantôt en anglais et tantôt en français. La plupart datent des vingt années 1956-1976. Ils évoquent des questions telles que la rédaction des éléments de Bourbaki, la cohomologie galoisienne, la géométrie rigide, les conjectures de Tate sur les cycles algébriques, les groupes formels et p-divisibles, la multiplication complexe, et les formes modulaires : propriétés de congruence, formes de poids 1, représentations galoisiennes.
Ces volumes devraient être utiles aux amateurs de théorie des nombres, ainsi qu'aux historiens des mathématiques.

Previous titles published in this series

J. Tits - Résumés des cours au Collège de France (1973 - 2000)
ISBN 978-2-85629-774-2
DM12 - 2013 - 390 pages - Public: 98 € - Members: 68 €

L. Schwartz - Œuvres scientifiques (I) (II) (III)
ISBN 978-285629-317-1 ; 978-285629-318-8 ; 978-285629-319-5
DM9-10-11 - 2011 - 1649 pages - Public: 79 € - Members: 55 € (each)
Public: 216 € - Members: 151 € (three volumes with a free DVD) - ISBN 978-2-85629-337-9

M. Demazure, A. Grothendieck - Schémas en groupes, (SGA 3, Tome III) - Structure des schémas en groupes réductifs - Séminaire de Géométrie Algébrique du Bois Marie 1962-1964
ISBN 978-2-85629-324-9
DM8 - 2011 - 337 pages - Public: 68 € - Members: 47 €

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ISBN 978-2-85629-314-0
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M. Audin - Correspondance entre Henri Cartan et André Weil (1928-1991)
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DM6 - 2011 - 720 pages - Public: 68 € - Members: 47 €

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DM5 - 2007 - 188 pages - Public: 45 € - Members: 32 €

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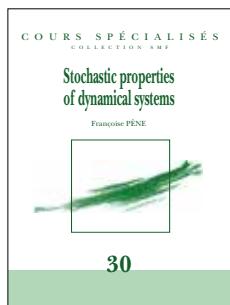
Vol. 30
Stochastic properties of dynamical systems
F. PÈNE

ISBN 978-2-85629-967-8
2022 - 276 pages - Hardcover. 17 x 24
Public: 54 € - Members: 38 €

This book provides an introduction to the study of the stochastic properties of probability preserving dynamical systems. Only the usual knowledge of the first year of a Master's degree is required. Many reminders are given. The definitions and results are illustrated by examples and corrected exercises. The book presents the notions of Poincaré's recurrence, of ergodicity, of mixing. It enlights also existing links between dynamical systems and Markov chains. The final objective of this book is to present three methods for establishing central limit theorems in the context of chaotic dynamical systems: a first method based on martingale approximations, a second method based on perturbation of quasi-compact linear operators and a third method based on decorrelation estimates.
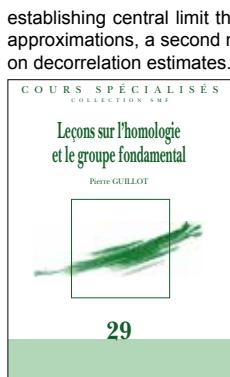
Vol. 29
Leçons sur l'homologie et le groupe fondamental
P. GUILLOT

ISBN 978-2-85629-965-4
2022 - 334 pages - Hardcover. 17 x 24
Public: 60 € - Members: 42 €

This book is an expanded version of lectures notes produced by the author as he was lecturing at the university of Strasbourg on the subject of algebraic topology. After preliminaries on homotopy theory, the fundamental group, categories and functors, the focus is on the homology of simplicial complexes first and then general topological spaces. The classical applications are given (Brouwer's theorem, the hairy ball theorem, the Euler characteristic of the platonic solids...) and Poincaré duality is introduced. In the third part of the book, which is more advanced, homological algebra is studied in more detail before the theory of sheaves is developed. The lectures are concluded with the proof of the difficult de Rham theorem, relating homology to differential forms.
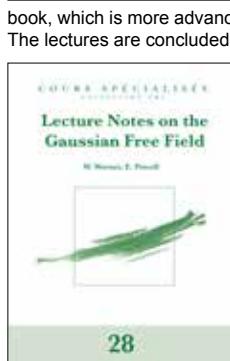
Vol. 28
Lecture Notes on the Gaussian Free Field
W. WERNER, E. POWELL

ISBN 978-2-85629-952-4
2021 - 184 pages - Hardcover. 17 x 24
Public: 43 € - Members: 30 €

The Gaussian Free Field (GFF) in the continuum appears to be the natural generalization of Brownian motion, when one replaces time by a multidimensional continuous parameter. While Brownian motion can be viewed as the most natural random real-valued function defined on R^+ with B(0)=0, the GFF in a domain D of R^d for d≥2 is a natural random real-valued generalized function defined on D with zero boundary conditions on D. The goal of these lecture notes is to describe some aspects of the continuum GFF and of its discrete counterpart defined on lattices, with the aim of providing a gentle self-contained introduction to some recent developments on this topic, such as the relation between the continuum GFF, Brownian loop-soups and the Conformal Loop Ensembles CLE4.

Vol. 27

Cycles analytiques complexes II : l'espace des cycles

D. Barlet, J. Magnusson

Ce second volume commence par donner la construction de l'espace des cycles compacts d'un espace complexe donné. On y trouvera les démonstrations des résultats admis dans le premier volume. Les chapitres qui suivent traitent des sujets dont voici la liste :
- Classe fondamentale d'un cycle. Relation entre famille analytique de cycles et classe fondamentale relative.
- Théorie de l'intersection avec paramètres dans une variété complexe puis dans un espace complexe quasi-lisse.
- Variété de Chow et espace des cycles d'un espace complexe quasi-projectif.
- Morphisme Douady → Cycles.
- Convexité holomorphe dans l'espace des cycles compacts et intégration de classes de ∂^{-}-cohomologie.
- L'espace des cycles compacts d'une variété Kählérienne est Kählérien.

Vol. 26

An introduction to expander graphs

E. Kowalski

Expander graphs are families of finite graphs that are simultaneously relatively sparse and highly connected. Since their discovery in the lates 1960s, they have appeared in many seemingly unrelated areas of mathematics, from theoretical computer science to arithmetic and algebraic geometry, from representation theory to number theory. The goal of this book is to present the theory of expander graphs and to explore some of these rich connections. Besides a careful exposition of the basic parts of the theory, including the Cheeger constant, random walks and spectral gap characterizations of expander graphs, it contains many different constructions of various families of expander graphs. The applications that are surveyed in the last chapter try to communicate the remarkable reach of expander graphs in modern mathematics.

Vol. 25

Lectures on Elliptic Methods for Hybrid Inverse Problems

G. S. Alberti, Y. Capdeboscq

In recent years, several new imaging modalities have been developed in order to be able to detect physical parameters simultaneously at a high spatial resolution and with a high sensitivity to contrast. These new approaches typically rely on the interaction of two physical imaging methods, and the corresponding mathematical models are the so-called hybrid, or coupled-physics, inverse problems. The combination of two physical modalities poses new mathematical challenges: the analysis of this new class of inverse problems requires the use of various mathematical tools, often of independent interest. This book intends to provide a first comprehensive course on some of these tools (mainly related to elliptic partial differential equations) and on their applications to hybrid inverse problems. For certain topics, such as the observability of the wave equation, the generalisation of the Radó-Kneser-Choquet Theorem to the conductivity equation, complex geometrical optics solutions and the Runge approximation property, we review well-known results. The material is presented with a clear focus on the intended applications to inverse problems. On other topics, including the regularity theory and the study of small-volume perturbations for Maxwell's equations, scattering estimates for the Helmholtz equation and the study of non-zero constraints for solutions of certain PDE, we discuss several new results. We then show how all these tools can be applied to the analysis of the parameter reconstruction for some hybrid inverse problems: Acousto-Electric tomography, Current Density Impedance Imaging, Dynamic Elastography, Thermoacoustic and Photoacoustic Tomography.
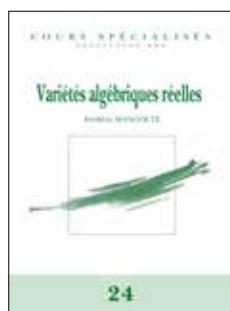
Vol. 24
Variétés algébriques réelles
F. Mangolte

ISBN 978-2-85629-864-0
2017 - 484 pages - Hardcover. 17 x 24
Public: 70 € - Members: 49 €

Les variétés algébriques réelles sont omniprésentes. Ce sont les premiers objets rencontrés lors de l'apprentissage des coordonnées puis des équations. Pourtant l'étude systématique de ces objets, si élémentaires soient-ils, est redoutable. Ce livre s'adresse à deux types de publics : il s'agit tout autant d'accompagner le lecteur, muni du seul bagage d'algèbre et géométrie niveau master, dans l'apprentissage des bases de cette riche théorie que d'apporter au lecteur plus avancé de nombreux résultats fondamentaux souvent absents de la littérature disponible, le fameux « folklore ». En particulier, l'introduction pour les non-spécia-listes des méthodes topologiques de la théorie constitue l'une des originalités de l'ouvrage. Les trois premiers chapitres présentent les bases et les méthodes classiques de la géométrie algébrique complexe et réelle. Les trois derniers chapitres se concentrent chacun sur un aspect plus spécifique des variétés algébriques réelles. Un panorama des connaissances classiques y est dressé ainsi que des développements majeurs de ces vingt dernières années en matière de topologie et géométrie des variétés de dimension deux et trois, sans oublier les courbes, sujet central du fameux XVIe problème de Hilbert. Des exercices de niveaux variés sont proposés et les solutions de bon nombre d'entre eux sont données à la fin de chaque chapitre.
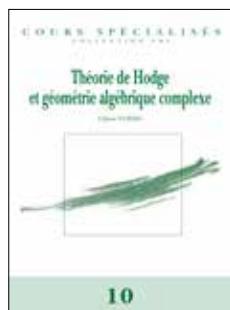
Vol. 10 (nouvelle impression)
Théorie de Hodge et géométrie algébrique complexe
C. Voisin

ISBN 978-2-85629-129-0
2016 - 595 pages - Hardcover. 17 x 24
Public: 50 € - Members: 35 €

Ce livre se situe à l'interface de la géométrie différentielle complexe et de la géométrie algébrique complexe. La première partie de l'ouvrage présente les résultats fondamen-taux de la théorie de Hodge, incluant quelques chapitres préliminaires sur la géométrie kählérienne et la cohomologie des faisceaux. Elle se conclut sur la notion de structure de Hodge et sur l'étude de sa dépendance vis-à-vis de la structure complexe. La seconde partie, d'un niveau plus avancé, présente les applications de la théorie de Hodge à la géométrie algébrique complexe. Elle débute par une étude de la topologie des familles de variétés algébriques, d'un point de vue à la fois classique et moderne, et se poursuit par des applications de la théorie des variations infinité-simales de structure de Hodge. Elle se conclut enfin par l'exposition des liens entre la théorie de Hodge et celle des cycles algébriques, débouchant sur les fameuses conjectures de Bloch et Beilinson. Ce livre est ainsi destiné aux étudiants doctorants et aux chercheurs, qui y trouveront à la fois un exposé didactique complet et une présentation de l'état de la recherche dans le domaine, initié par Griffiths, des applications de la théorie de Hodge à l'étude des cycles algébriques.
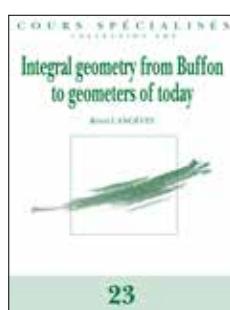
Vol. 23
Integral Geometry from Buffon to Geometers of Today
R. Langevin

ISBN 978-2-85629-822-0
2016 - 284 pages - Hardcover. 17 x 24
Public: 60 € - Members: 42 €

The little music of integral geometry, associated with the theory of geometric probabilities by L. A. Santaló, goes along with the main stream of mathematics since Buffon's Traité d'arithmétique morale in 1777. Integral geometry means to cut in all directions, or to project on all planes, all lines an object: a surface, a solid etc., and then observe and average. Statements are relations between what you got and the local geometry or to-pology of the object. Intersection and contact of an object with circles or spheres provide a conformal version of integral geometry. Pictures are an important part of the song.

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Séminaires et Congrès

Séminaires et Congrès [Seminars and Conferences] *is a book series aimed at student and professional mathematicians. It covers all fields of mathematics. Volumes are procee-dings of meetings.* (*issn 1285-2783*)

Vol. 33
SMF 2018 : Congrès de la Société Mathématique de France
E. Breuillard ed.

ISBN 978-2-85629-912-8
2019 - 432 pages - Softcover. 17 x 24
Public: 65 € - Members: 46 €

Ce volume rassemble les actes du 2e congrès de la Société Mathématique de France, qui a eu lieu à Lille en juin 2018.
This volumes gathers the proceedings of the 2nd Congress of the French Mathematical Society (SMF), which took place in Lille in June 2018.

Vol. 32
Spectral theory of graphs and of manifolds - CIMPA 2016 Kairouan, Tunisia
C. Anné and Nabila Torki-Hamza eds.

ISBN 978-2-85629-895-4
2018 - 261 pages - Softcover. 17 x 24
Public: 28 € - Members: 20 €

Devoted to the Spectral Theory on Graphs and Manifolds, the CIMPA Research School which took place at Kairouan (Tunisia) in November 2016 proposed six courses and two conferences. You can find in this volume the redaction of five of them: an introduction to the Sprectral Theory on Combinatorial and Quantum Graphs by E. M. Harrell, an introduc-tion to the Sprectral Theory of Unbounded Operators by H. Najar, a presentation of the Study of the Absolute Sprectrum of Discrete Operators by S. Golenia, a presentation of Random Schrödinger Operators of Discrete Structures by C. Rojas-Molina and the presentation of the Theory of Critical Points at infinity on CR-manifolds by N. Gamara. The last one, on Geometric Bounds on the Eigenvalues of Graphs, by N. Anantaraman is just summarized as it was podcasted and is still available on Internet. Finally you can read the text of the conference of L. Hillairet on two applications of the Dirichlet-Neumann Bracketing.

Vol. 31
Actes du 1er congrès national de la SMF - Tours 2016
C. Lecouvey, éd.

ISBN 978-2-85629-866-4
2017 - 136 pages - Softcover. 17 x 24
Public: 35 € - Members: 24 €

Ce volume groupe les contributions des conférenciers pléniers du congrès de la SMF. M.-C. Arnaud explique le lien entre dynamique hamiltonienne et méthodes variation-nelles lagrangiennes, pour introduire en douceur la théorie d'Aubry-Mather. S. Grivaux et C. Badea suggèrent de comprendre certaines classes d'entiers, les ensembles de Jamison et ensembles de Kazdhan, à l'aune de la théorie des opérateurs et de l'analyse harmonique. S. Gouëzel exploite toute la richesse des propriétés de sous-additivité et des horofonctions pour décrire le comportement asymptotique de produits de semi-contractions aléatoires. B. Toën et G. Vezzosi présentent une approche générale pour établir la formule du conducteur de Bloch, qui est une formule conjecturale décrivant le chan-gement de topologie dans une famille de variétés algébriques lorsque le paramètre se spécialise en une valeur critique. Enfin, A. Tsybakov, P. Bellec et G. Lecué s'intéressent à la performance de certains estimateurs des moindres carrés avec pénalisation et présentent les idées maîtresses et les outils qui ont permis de substantielles améliorations ces dernières années.

Vol. 30
PDE's, Dispersion, Scattering Theory and Control Theory
K. Ammari, G. Lebeau eds.

ISBN 978-2-85629-858-9
2017 - 153 pages - Softcover. 17 x 24
Épuisé

This book results from notes of the lectures given in Monastir from 10 to 14 June 2013 during the workshop about the dispersion and scattering theory and control theory of partial differential equations.
This volume contains surveys of active research topics, along with original research papers containing exciting new results on the PDE's, dispersion, scattering and control theory. It will therefore benefit both graduate students and researchers.

Vol. 29
Control and Stabilization of Partial Differential Equations
K. Ammari, ed.

ISBN 978-2-85629-817-6
2015 - 119 pages - Softcover. 17 x 24
Public: 25 € - Members: 18 €

This book results from notes of the lectures given in Monastir from 9 to 19 May 2011 during the CIMPA school Control and Stabilization of PDEs. Different control techniques for linear parabolic equations were presented and the deduction of the null controllability of such equations from local Carleman inequality was described. Overall Carleman-type and Hardy type inequalities for the null controllability of degenerate parabolic equations were discussed. Current issues in the control of conservation laws, such as the control of classical solutions in singular control limits, and the control solutions with shock waves, were also highlighted during this school. Finally, different techniques and methods for the stability of evolution equations with and without delay, applicable to Navier-Stokes equations were presented.

Vol. 28
Self-Similar Processes and their Applications
L. Chaumont, P. Graczyk, L. Vostrikova, eds.

ISBN 978-2-85629-365-2
2013 - 121 pages - Softcover. 17 x 24
Public: 29 € - Members: 20 €

This volume contains some articles related to the conference Self-similar processes and their applications which took place in Angers, from the 20th to the 24th of July 2009. Self-similarity is the property which certain stochastic processes have of preserving their distribution under a time-scale change. This property appears in all areas of probability theory and offers a number of fields of application. The aim of this conference is to bring together the main representatives of different aspects of self-similarity currently being studied in order to promote exchanges on their recent research and enable them to share their knowledge with young researchers.

Vol. 27
Geometric and Differential Galois Theories
D. Bertrand, Ph. Boalch, J-M. Couveignes, P. Dèbes, eds.

ISBN 978-2-85629-364-5
2013 - 247 pages - Softcover. 17 x 24
Public: 44 € - Members: 31 €

On March 29th April 2nd, 2010, a meeting was organized at the Luminy CIRM (France) on geometric and differential Galois theories, witnessing the close ties these theories have woven in recent years. The present volume collects the Proceedings of this meeting. Although it may be viewed as a continuation of the one held 6 years earlier on arithmetic and differential Galois groups (see *Séminaires Congrès*, vol. 13), several new and promising themes have appeared. The articles gathered here cover the following topics: moduli spaces of connexions, differential equations and coverings in finite characteristic, liftings, monodromy groups in their various guises (tempered fundamental group, motivic groups, generalized difference Galois groups), and arithmetic applications.

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24-II - 2012 - 385 pages - Public: 77 € - Members: 54 €

Arithmetic and Galois Theories of Differential Equations - L. Di Vizio, R. Tanguy, eds.
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SC23 - 2011 - 405 pages - Public: 86 € - Members: 61 €

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P. Baird, A. El Soufi, A. Fardoun, R. Regbaoui, eds.
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SC22 - 2011 - 174 pages - Public: 45 € - Members: 32 €

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SC20 - 2011 - 266 pages - Public: 45 € - Members: 32 €

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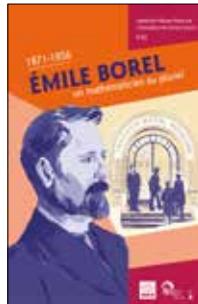
Émile Borel, un mathématicien au pluriel
collection « Maison Poincaré [Regards mathématiques] ».

ISBN 978-2-85629-962-3
2022 - 32 pages - Softcover. 16 x 24 cm
Public: 9 € - Members: 9 €

Émile Borel, homme de sciences et intellectuel engagé dans la cité, est un mathématicien aux multiples activités. Ses travaux en analyse et probabilités sont motivés par son intérêt pour les problèmes de la physique et de la vie sociale. Homme d'action, de réseaux, il s'implique dans la diffusion des sciences et la pédagogie, et est un acteur majeur du milieu intellectuel de la première moitié du vingtième siècle en Europe. Portrait d'un savant dont les intuitions et engagements nous parlent encore aujourd'hui !
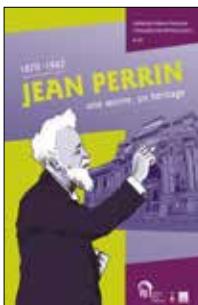
Jean Perrin, une œuvre, un héritage
collection « Maison Poincaré [Regards mathématiques] ».

ISBN 978-2-85629-949-4
2021 - 32 pages - Softcover. 16 x 24 cm
Public: 8 € - Members: 8 €

Un fascicule consacré à Jean Perrin, une personnalité scientifique flamboyante de la première moitié du XXe siècle qui reçut le prix Nobel de physique en 1926 pour avoir prouvé expérimentalement l'existence des atomes. Outre ses œuvres scientifiques, Jean Perrin laisse en héritage une vision de l'organisation de la recherche et de l'engagement des scientifiques dans la société, un élan et un enthousiasme qui nous touchent encore aujourd'hui.
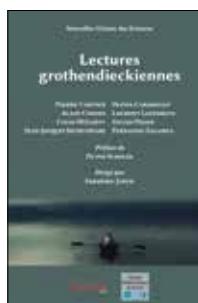
Lectures grothendieckiennes
P. CARTIER, A. CONNES, C. MACLARTY, J.-J. SZCZECINIARZ, O. CARAMELLO, L. LAFFORGUE, G. PISIER, F. ZALAMEA.

ISBN 978-2-85629-950-0
2021 - 304 pages - Softcover. 16 x 24 cm
Public: 32,90 € - Members: 23 €

Lectures grothendieckiennes rassemble les textes qui font suite à un séminaire qui s'est tenu au département de mathématiques de l'École Normale Supérieure de 2017 à 2018. Le livre présente une pensée complexe à l'œuvre, celle de l'un des mathématiciens les plus influents et énigmatiques du 20e siècle : Alexander Grothendieck. Les auteurs, Pierre Cartier, Olivia Caramello, Alain Connes, Laurent Lafforgue, Colin McLarty, Gilles Pisier, Jean-Jacques Szczeciniarz et Fernando Zalamea, dévoilent à leur façon les conséquences mathématiques ou philosophiques que l'on peut tirer d'une œuvre monumentale qui a transformé le paysage mathématique du 20e siècle et qui a probablement ouvert une nouvelle ère mathématique que nous avons seulement commencé à explorer.
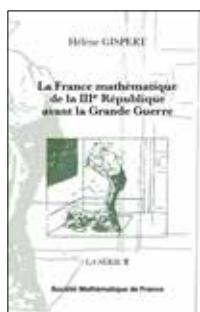
La France mathématique de la IIIe république avant la grande guerre
H. GISPERT

ISBN 978-2-85629-797-1
ST3 - 2015 - 358 pages - Softcover. 16 x 24 cm
Public: 45 € - Members: 32 €

Ce livre est la réédition - mise en perspective grâce à une préface qui revient sur vingt ans de résultats, d'enquêtes, d'apports méthodologiques en histoire des mathématiques - de l'ouvrage paru en 1991 consacré à La France mathématique de 1870 à 1914. S'attachant à l'étude des membres de la SMF et de leur production, aux grandes figures des mathématiques mais aussi à de nombreux autres acteurs et à leurs institutions, l'auteure dresse le tableau des grands bouleversements de la France mathématique des premières décennies de la Troisième République.

Les « supermathématiques » et F. A. Berezin
C. ANNÉ, V. ROUBTSOV, ÉDS.

ISBN 978-2-85629-833-6
ST4 - 2018 - 154 pages - Softcover. 16 x 24 cm
Public: 40 € - Members: 28 €

Les supermathématiques, domaine au carrefour des mathématiques et de la physique théorique promis à de riches et fondamentaux développements, ont largement été fondées en Union Soviétique autour de la figure de Felix Alexandrovich Berezin (1931-1980), et ses travaux font maintenant partie des classiques. F. A. Berezin disparut prématurément le 14 juillet 1980 dans un accident durant une expédition géologique dans la région de la Kolyma. Ses amis et collègues, en rappelant leurs souvenirs, nous parlent d'un grand scientifique pris dans les tourments de l'histoire : une formation scientifique sous Staline, avec la chasse aux anciens révolutionnaires et la discrimination antisémite, et une carrière dans l'Union Soviétique de la deuxième glaciation, l'ère Brejnev.

Cinq minutes de mathématiques
E. BEHRENDS, traduit par Y. HARALAMBOUS

ISBN 978-2-85629-325-6
ST2 - 2011 - 387 pages - Softcover. 16 x 24 cm
Public: 33 € - Members: 23 €

Une délicieuse promenade autour de mathématiques accessibles sans connaissances avancées, par tranche de cinq minutes.

Une histoire de Jacques Feldbau
M. AUDIN

ISBN 978-2-85629-277-8
ST1 - 2010 - 132 pages - Softcover. 16 x 24 cm
Public: 23 € - Members: 17 €

Michèle Audin retrace l'activité mathématique et la vie de Jacques Feldbau né en 1914, empêché d'enseigner et de publier sous son nom par la législation antisémite de Vichy et mort en déportation en 1945.
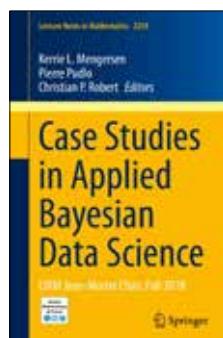
Case Studies in Applied Bayesian Data Science (CIRM Jean-Morlet Chair, Fall 2018)

K. L. MENGERSEN, P. PUDLO, C. P. ROBERT (Eds.)

ISBN 978-2-85269-914-2
2020 - 420 pages - Softcover. 17 x 24
Public: 53,54 € - Members: 37,48 €

Presenting a range of substantive applied problems within Bayesian Statistics along with their Bayesian solutions, this book arises from a research program at CIRM in France in the second semester of 2018, which supported Kerrie Mengersen as a visiting Jean-Morlet Chair and Pierre Pudlo as the local Research Professor. The field of Bayesian statistics has exploded over the past thirty years and is now an established field of research in mathematical statistics and computer science, a key component of data science, and an underpinning methodology in many domains of science, business and social science. Moreover, while remaining naturally entwined, the three arms of Bayesian statistics, namely modelling, computation and inference, have grown into independent research fields. While the research arms of Bayesian statistics continue to grow in many directions, they are harnessed when attention turns to solving substantive applied problems. Each such problem set has its own challenges and hence draws from the suite of research a bespoke solution. The book will be useful for both theoretical and applied statisticians, as well as practitioners, to inspect these solutions in the context of the problems, in order to draw further understanding, awareness and inspiration.
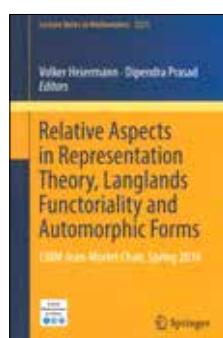
Relative Aspects in Representation Theory, Langlands Functoriality and Automorphic Forms (CIRM Jean-Morlet Chair, Spring 2016)

V. HEIERMANN, D. PRASAD (Eds.)

ISBN 978-3-319-95230-7
2018 - 361 pages - Softcover. 17 x 24
Public: 53,54 € - Members: 37,48 €

This volume presents a panorama of the diverse activities organized by V. Heiermann and D. Prasad in Marseille at the CIRM for the Chaire Morlet event during the first semester of 2016. It assembles together expository articles on topics which previously could only be found in research papers. Starting with a very detailed article by P. Baumann and S. Riche on the geometric Satake correspondence, the book continues with three introductory articles on distinguished representations due to P. Broussous, F. Murnaghan, and O. Offen; an expository article of I. Badulescu on the Jacquet–Langlands correspondence; a paper of J. Arthur on functoriality and the trace formula in the context of «Beyond Endoscopy», taken from the Simons Proceedings; an article of W-W. Li attempting to generalize Godement–Jacquet theory; and a research paper of C. Moeglin and D. Renard, applying the trace formula to the local Langlands classification for classical groups. The book should be of interest to students as well as professional researchers working in the broad area of number theory and representation theory.

Jean-Pierre Kahane

ISBN 978-2-85629-902-9
2019 - 80 pages - Softcover. 21 x 27
Public: 25 € - Members: 18 €

Entré au CNRS en 1950, et mort au travail (comme il le souhaitait) en 2017, Jean-Pierre Kahane a eu une carrière scientifique très longue et féconde, avec des centres d'intérêt assez variés (il aimait se qualifier, avec un grain de sel, d'amateur en Mathématiques) dont voici un échantillon : fonctions entières et séries de Dirichlet, théorie analytique des nombres, analyse de Fourier et ensembles minces, analyse fonctionnelle (algèbres de Banach), probabilités discrètes (inégalités de Khintchine-Kahane) ou continues (mouvement brownien, chaos multiplicatif, etc.). Le présent numéro de la Gazette a pour ambition de rendre hommage à cette ersonnalité et ce mathématicien de grande envergure, sous forme d'hommages et de souvenirs personnels de la part des mathématiciens qui l'ont rencontré ou ont collaboré avec lui. Ce volume présente aussi quelques-unes des principales contributions de Jean-Pierre Kahane, le tout replacé dans le contexte de sa longue carrière (1961-2017) à l'université d'Orsay.
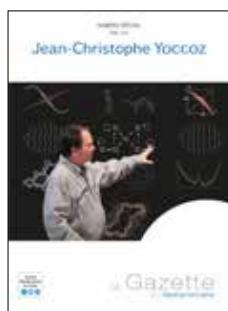
Jean-Christophe Yoccoz

ISBN 978-2-85629-879-4
2018 - 132 pages - Softcover. 21 x 27
Public: 25 € - Members: 18 €

Jean-Christophe Yoccoz était une figure emblématique de l'école mathématique française. Professeur au Collège de France, académicien, il avait reçu la médaille Fields en 1994. Impressionnant par la rapidité, la profondeur et l'élégance de sa pensée, il a considérablement influencé les différentes branches des systèmes dynamiques. Il marquait son entourage par sa personnalité attachante, sa simplicité et sa gentillesse. Ce volume rend hommage à différentes facettes de la vie mathématique de Jean-Christophe Yoccoz. Il comprend à la fois des textes de souvenirs et des présentations de ses plus importants travaux scientifiques.

Benoît Mandelbrot, père de la géométrie fractale
sous la direction de S. JAFFARD et S. SEURET

ISBN 978-2-85629-360-7
GA136 - 2013 - 192 pages - Softcover. 17 x 24
Public: 25 € - Members: 18 €

Bien plus que tout autre, le nom de Benoît Mandelbrot est associé à la géométrie fractale. Ce mathématicien franco-américain, mais aussi physicien, informaticien, a bousculé les frontières entre disciplines. Son regard sans *a priori* s'est attaché à la description de phénomènes mathématiques, physiques et géophysiques, économiques, sociologiques, faisant fi des théories préexistantes. Dans cet ouvrage, de proches collaborateurs témoignent des bouleversements qu'il a apportés dans chacune de leurs disciplines. Au travers de leurs textes surgit le portrait d'une personnalité scientifique hors norme.
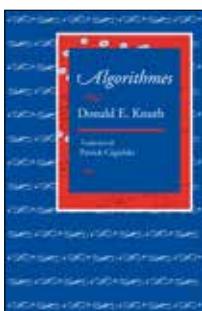
Algorithmes
D. KNUTH, traduit par P. CÉGIELSKI

ISBN 978-1-57586-620-8
510 pages - Softcover. 15 x 23 cm
Public: 32 € - Members: 22 €

Donald Knuth n'est pas seulement l'inventeur de TeX, indispensable aux scientifiques d'aujourd'hui. C'est avant tout un informaticien de légende, auteur de grands classiques sur l'art de la programmation et les mathématiques discrètes. Voici aujourd'hui une sélection de ses articles traduits en franççais. Les titres des différents chapitres suffisent à aiguiser la curiosité : « Mathématiques et informatique : faire face au fini » ; « les problèmes récréatifs sont-ils utiles ? »; « les liens valsants », etc.
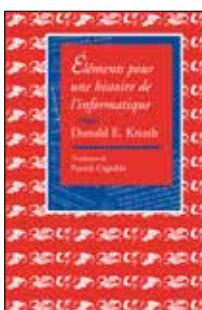
Éléments pour une histoire de l'informatique
D. KNUTH, traduit par P. CÉGIELSKI

ISBN 978-1-57586-622-2
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Public: 32 € - Members: 22 €

Voici enfin la traduction en français d'une série de quinze articles classiques de Donald E. Knuth portant sur des moments clés de l'histoire de l'informatique, plus exactement l'algorithmique, que ce soit à l'époque babylonienne ancienne, au neuvième siècle lors de l'âge d'or des sciences arabes ou après l'invention des ordinateurs : étude des premiers programmes, des premiers langages de programmation et des premiers compilateurs. On y retrouve également l'historique des notions chères à Knuth : découpage d'un paragraphe en ligne, grammaires à attributs et vocabulaire de l'analyse des algorithmes.

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