

# La Théorie Algorithmique des Nombres

Exposé Premier:  
Unité Fondamental et Régulateur par Fractions Continues

<b>Conférence:</b>	École de Recherche CIMPA UNESCO Maroc
<b>Sujet:</b>	Théorie des Nombres et ses Applications
<b>Place:</b>	Université Mohammed Premier, Faculté des Sciences (FSO)
<b>Venue:</b>	Oujda, Region Oriental, Maroc
<b>Date:</b>	Lundi, Mai 25, 2015
<b>Temps:</b>	10:15 – 11:15, a.m.
<b>Auteur:</b>	Daniel C. Mayer (Autriche)

## Our Top-Recent Trilogy.

- [T1] D.C. Mayer,  
Periodic bifurcations in  
descendant trees of finite  $p$ -groups,  
*Adv. Pure Math.*, **5** (2015), no. 4, 162–195,  
Special Issue on Group Theory.
- [T2] D.C. Mayer,  
Index- $p$  abelianization data of  
 $p$ -class tower groups,  
*Adv. Pure Math.*, **5** (2015), no. 5, 286–313,  
Special Issue on Number Theory  
and Cryptography.  
(29th Journées Arithmétiques 2015,  
University of Debrecen, Hungary, Jul. 2015.)
- [T3] D.C. Mayer,  
Periodic sequences of  $p$ -class tower groups,  
*J. Appl. Math. Phys.*  
(International Conference on  
Groups and Algebras 2015,  
Shanghai, Jul. 2015.)

## Our Most Recent Presentations.

- [P1] D.C. Mayer and M.F. Newman,  
*Finite 3-groups  
as viewed from class field theory*,  
Groups St Andrews 2013,  
Univ. of St Andrews, Fife, Scotland, Aug. 2013.
- [P2] D.C. Mayer, M.R. Bush, and M.F. Newman,  
*3-class field towers of exact length 3*,  
18th ÖMG Congress and  
123rd Annual DMV Meeting 2013,  
Univ. of Innsbruck, Tyrol, Austria, Sep. 2013.
- [P3] D.C. Mayer, M.R. Bush, and M.F. Newman,  
*Class towers and capitulation  
over quadratic fields*,  
West Coast Number Theory 2013,  
Asilomar Conference Center, Pacific Grove,  
Monterey, California, USA, Dec. 2013.

## Our Modern Tetralogy.

- [MT1] D.C. Mayer,  
The second  $p$ -class group of a number field,  
*Int. J. Number Theory* **8** (2012),  
no. 2, 471–505.
- [MT2] D.C. Mayer,  
Transfers of metabelian  $p$ -groups,  
*Monatsh. Math.* **166** (2012),  
no. 3–4, 467–495.
- [MT3] D.C. Mayer,  
Principalization algorithm  
via class group structure,  
*J. Théor. Nombres Bordeaux* **26** (2014),  
no. 2, 415–464.
- [MT4] D.C. Mayer,  
The distribution of second  $p$ -class groups  
on coclass graphs,  
*J. Théor. Nombres Bordeaux* **25** (2013),  
no. 2, 401–456.  
(27th Journées Arithmétiques 2011,  
Faculty of Mathematics and Informatics,  
University of Vilnius, Lithuania, Jul. 2011.)

## Our Classical Tetralogy.

- [CT1] D.C. Mayer,  
Lattice minima and units  
in real quadratic number fields,  
*Publ. Math. Debrecen* **39** (1991),  
no. 1–2, 19–86.
- [CT2] D.C. Mayer,  
Multiplicities of dihedral discriminants,  
*Math. Comp.* **58** (1992),  
no. 198, 831–847 and S55–S58.  
(Westcoast Number Theory Conference 1990,  
Asilomar Conference Grounds, Pacific Grove,  
Monterey, California, USA, Dec. 1990).
- [CT3] D.C. Mayer,  
Discriminants of metacyclic fields,  
*Canad. Math. Bull.* **36** (1) (1993), 103–107.
- [CT4] D.C. Mayer,  
Quadratic  $p$ -ring spaces  
for counting dihedral fields,  
*Int. J. Number Theory* **10** (2014),  
no. 8, 2205–2242.

## References.

- [1] H. Cohen,  
*A course in computational algebraic number theory*,  
Graduate texts in mathematics **138**,  
Springer, 1996.
- [2] H. Cohen,  
*Advanced topics in computational number theory*,  
Graduate texts in mathematics **193**,  
Springer, 2000.
- [3] M. Pohst and H. Zassenhaus,  
*Algorithmic algebraic number theory*,  
Encyclopedia of mathematics and its applications,  
Cambridge University Press, 1990.
- [4] S.S. Wagstaff, Jr.,  
*The Joy of Factoring*,  
Student Mathematical Library (STML), Vol. **68**,  
American Mathematical Society (AMS), 2013.

## Information Technology.

- [1] The GAP Group,  
*GAP – Groups, Algorithms, and Programming —  
a System for Computational Discrete Algebra*,  
Version 4.7.7,  
Aachen, Braunschweig, Fort Collins, St. Andrews, 2015,  
(<http://www.gap-system.org>).
- [2] The MAGMA Group,  
*MAGMA Computational Algebra System*, Version 2.21-3,  
Sydney, 2015,  
(<http://magma.maths.usyd.edu.au>).
- [3] Oracle,  
*JDK 7u80, Java SE, and NetBeans*, Version 8.0.2,  
Redwood City, CA, 2015,  
(<http://www.oracle.com>).
- [4] The PARI Group,  
*PARI/GP*, Version 2.7.3,  
Bordeaux, 2015,  
(<http://pari.math.u-bordeaux.fr>).

### Further References.

- [1] E. Artin, Idealklassen in Oberkörpern und allgemeines Reziprozitätsgesetz, *Abh. Math. Sem. Univ. Hamburg* **7** (1929), 46–51.
- [2] J.R. Brink, *The class field tower for imaginary quadratic number fields of type (3, 3)* (Dissertation, Ohio State University, 1984).
- [3] J.R. Brink and R. Gold, Class field towers of imaginary quadratic fields, *manuscripta math.* **57** (1987), 425–450.
- [4] G. Frei, P. Roquette, and F. Lemmermeyer, *Emil Artin and Helmut Hasse. Their Correspondence 1923–1934*, Universitätsverlag Göttingen, 2008.
- [5] F.-P. Heider und B. Schmithals, Zur Kapitulation der Idealklassen in unverzweigten primzyklischen Erweiterungen, *J. Reine Angew. Math.* **336** (1982), 1–25.
- [6] H. Kisilevsky, Number fields with class number congruent to 4 mod 8 and Hilbert’s theorem 94, *J. Number Theory* **8** (1976), 271–279.
- [7] D.C. Mayer, Principalization in complex  $S_3$ -fields, *Congressus Numerantium* **80** (1991), 73–87.  
(Proceedings of the 20th Manitoba Conference on Numerical Mathematics and Computing, Winnipeg, Manitoba, Canada, Sep. 1990).
- [8] A. Scholz und O. Taussky, Die Hauptideale der kubischen Klassenkörper imaginär quadratischer Zahlkörper: ihre rechnerische Bestimmung und ihr Einfluß auf den Klassenkörperturm, *J. Reine Angew. Math.* **171** (1934), 19–41.
- [9] I.R. Shafarevich, Extensions with prescribed ramification points, *Publ. Math., Inst. Hautes Études Sci.* **18** (1963), 71–95 (Russian). English transl. by J.W.S. Cassels: *Am. Math. Soc. Transl.*, II. Ser., **59** (1966), 128–149.
- [10] O. Taussky, A remark concerning Hilbert’s Theorem 94, *J. Reine Angew. Math.* **239/240** (1970), 435–438.