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MATHEMATIQUE ET APPLICATIONS (CIPMA)*

*RAPPORT SCIENTIFIQUE DE L'ANNEE 2005*

**UNESCO CHAIR OF MATHEMATICAL  
PHYSICS AND APPLICATIONS  
(ICMPA-UNESCO CHAIR)**

**YEAR 2005 SCIENTIFIC REPORT**

February 1, 2024

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# 1 SCIENTIFIC ACTIVITIES

## 1.1 LIST OF PUBLICATIONS

### 1.1.1 By the members in Benin

1. M. N. Hounkonnou and K. Sodoga,  
*Generalized Coherent States for Associated Hypergeometric - type functions*  
J. Phys. A: Math. Gen. **38** 7851 - 7862 (2005).
2. M. N. Hounkonnou, K. Sodoga and E. S. Azatassou,  
*Factorization of Sturm-Liouville Operators: Solvable Potentials and Underlying Algebraic Structure,*  
J. Phys. A: Math. Gen. **38** 371 - 390 (2005).
3. F. Massamba and G. Thompson,  
*On a System of Seiberg - Witten Equations,*  
Journal of Geometry and Physics, *in press.*
4. C. Hounnga, M. N. Hounkonnou and A. Ronveaux,  
*New Families of Orthogonal Polynomials,*  
J. comp. Appl. Math., *in press.*
5. M. N. Hounkonnou,  
*Mathematics from Africa: Status, Goals and Responsibilities,*  
(Polimetrica Publishing, International Scientific Publisher, Italy), *in press.*
6. E. Baloitcha and G. G. Balint-Kurti,  
*Theory of photodissociation of Ozone in the Hartley continuum; effect of vibrational excitation and  $O(^1D)$  atom velocity distribution,*  
Phys. Chem. Chem. Phys., **7**, 3829 (2005).

### 1.1.2 By the members in Cameroon

1. *See ICMIPA Scientific Report for 2004 - 2005*

### 1.1.3 By the members outside Africa

1. G. Stenuit, S. Michotte, J. Govaerts and L. Piraux,  
*Temperature Dependence of Penetration and Coherence Lengths in Lead Nanowires,*  
Supercond. Sci. Technol. **18** (2005) 174 - 182.
2. D. Bertrand, J. Govaerts, Gh. Grégoire and S. Ovyin, *The APTOVOL Experiment: A Parabolic Test Of the constancy of the Velocity Of Light,*  
Physicalia Magazine 27 (2005) 227 - 236.
3. F. E. Gray, J. Govaerts et al., *The muLAN and muCAP Collaborations, Precision Muon Lifetime and Capture Experiments at PSI,* Proceedings of the 6th International Workshop

on Neutrino Factories and Superbeams (NuFACT04), Osaka (Japan), July 26 - August 1st, 2004, Nuclear Physics Proceedings Supplements 149 (2005) 344 - 347.

4. B. Lauss, J. Govaerts et al., *The muLAN and muCAP Collaborations, New Precision Determination of  $g_P$  and  $G_F$ : The MuXperiment at PSI*, Proceedings of the International Conference on Exotic Atoms and Related Topics (EXA'05), Vienna (Austria), February 21 - 25, 2005, eds. A. Hirtl, J. Marton, E. Widmann and J. Zmeskal (Austrian Academy of Sciences Press, Vienna, 2005), pp. 259 - 268.
5. F. G. Scholtz, B. Chakraborty, S. Gangopadhyay and J. Govaerts, *Interactions and Non-commutativity in Quantum Hall Systems*, J. Phys. A38 (2005) 9849 - 9858.

## 1.2 PUBLISHED BOOKS

1. S.T. Ali, G.G. Emch, A. Odziejewicz, M. Schlichenmaier and L. Woronowicz, *Twenty Years of Bialowieza: A Mathematical Anthology*, (Aspects of Differential Geometric Methods in Physics), World Scientific, Singapore (2005).

## 1.3 INTERNAL REPORTS AND PREPRINTS

### 1.3.1 By the members in Benin

1. M. N. Hounkonnou, A. Ronveaux and K. Sodoga, *Heun's Differential Operators: Factorisation and Solvable Potentials*, ICMIPA-MPA/2005/01 (2005).
2. A. Anjorin and M. N. Hounkonnou, *Basic Set of Polynomials: General Overview*, ICMIPA-MPA/2005/02 (2005).
3. A. Anjorin and M. N. Hounkonnou, *Basic Set of Chebychev Polynomials of the First Kind: Topological Aspects*, ICMIPA-MPA/2005/03 (2005).
4. A. Anjorin and M. N. Hounkonnou, *Basic Set of Chebychev Polynomials of the First Kind and Improved Whittaker's Constant*, ICMIPA-MPA/2005/04 (2005).
5. A. Anjorin and M. N. Hounkonnou, *Forward ( $\Delta$ ) and Backward ( $\nabla$ ) Difference Operator Basic Sets of Polynomials in Several Complex Variables*, ICMIPA-MPA/2005/05 (2005).
6. C. Hounga and M. N. Hounkonnou, *Discrete Semi-Classical Orthogonal Polynomials of Class 2*, ICMIPA-MPA/2005/06 (2005).

7. M. N. Hounkonnou, F. Massamba and J. Ben Geloun,  
*2-Dimensional Noncommutative Field Theory on the Light Cone*,  
ICMPA-MPA/2005/07 (2005). *to appear in WGMP XXIV Proceedings*, (2005).
8. M. N. Hounkonnou, F. Massamba and J. Ben Geloun,  
*Light Cone Gauge Field Theory in a Noncommutative 2D Spacetime*,  
ICMPA-MPA/2005/08 (2005).
9. J. ben Geloun, M. N. Hounkonnou and F. Massamba,  
*Algebraic Properties of the  $\star$  - Product*,  
ICMPA-MPA/2005/09 (2005).
10. J. Ben Geloun and M. N. Hounkonnou,  
*Multi-Indicial Symmetric Functions*,  
ICMPA-MPA/2005/10 (2005).
11. K. Sodoga and M. N. Hounkonnou,  
*Factorization of Position Dependent Hamiltonian Operator: Solvable Potentials*,  
ICMPA-MPA/2005/11 (2005).
12. M. M. Kabir and M. N. Hounkonnou,  
*Analytical Solution of a Generalized Nonlinear reaction - Diffusion Equation*  
ICMPA-MPA/2005/12 (2005).
13. J. Ben Geloun, J. Govaerts and M. N. Hounkonnou,  
*Some Aspects of the Bosonization of the Schwinger Model by a Noncommutative Chiral Boson*,  
ICMPA-MPA/2005/13 (2005).
14. F. Massamba,  
*Curvature and Rank 2 Seiberg - Witten Equations*,  
ICMPA-MPA/2005/14 (2005).
15. F. Massamba,  
*The Universal Metric on the Jacobian*,  
ICMPA-MPA/2005/15 (2005).
16. M. M. Kabir, M. N. Hounkonnou and B. Some,  
*Diffusion Equation Modelling a Brain Cancer Treatment: Symmetry Groups and Analytical Solutions*  
ICMPA-MPA/2005/16 (2005).
17. David Lauvergnat, Ezinvi Baloïtcha, Georges Dive and Michele Desouter-Lecomte  
*On-the-fly Gaussian wave packets with numerical kinetic energy operators in generalized coordinates: Cyclopentadiene Endo-dimerization*,  
ICMPA-MPA/2005/17 (2005).
18. K. Sodoga, M. N. Hounkonnou and G. debiais,  
*Exact Solutions of Sturm - Liouville Differential Equations: Potential Group Method*.  
ICMPA-MPA/2005/18 (2005).

### 1.3.2 By the members outside Africa

1. See *ICMPA Scientific Report for 2004 - 2005*

## 1.4 INVITED LECTURES

### 1.4.1 By members in Benin

1. to be completed

### 1.4.2 By the members outside Africa

1. See *ICMPA Scientific Report for 2004 - 2005*

## 1.5 SEMINARS GIVEN

### 1.5.1 By members in Benin

1. A. Anjorin,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 3<sup>rd</sup>, 2005,  
*Derived and Integrated Basic Sets of Polynomials in Several Complex Variables (I Part)*.
2. J. Ben Geloun,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 3<sup>rd</sup>, 2005,  
*Canonical Quantization: a General Overview*.
3. M. N. Hounkonnou,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 5<sup>th</sup>, 2005,  
*Semi-Classical Orthogonal Polynomials and Charlier Polynomials*.
4. J. Ben Geloun,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 10<sup>th</sup>, 2005,  
*Lagrangian Formulation of Dynamics and Noether Theorem in Classical Field Theory*.
5. J. Ben Geloun,  
Seminar of Mathematical Physics,  
2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 12<sup>th</sup>, 2005,  
*An Introduction to Quantum Field theory*.

6. E. Tchibozo,  
Seminar of Mathematical Physics,  
2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 12<sup>th</sup>, 2005,  
*Les Signaux Multidimensionnels a Caractere Géométrique et leur Utilisation pour la Photo-Interprétation des Images Satélitaires Multispectrales.*
7. J. Ben Geloun,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 14<sup>th</sup>, 2005,  
*Hamiltonian Constrained Dynamics and Quantization of Constrained Systems.*
8. F. Massamba,  
Seminar of Differential Geometry,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 19<sup>th</sup>, 2005,  
*The Higher Rank of Seiberg-Witten Equations.*
9. A. Anjorin,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, January 26<sup>th</sup>, 2005,  
*Derived and Integrated Basic Set of Polynomials in Several Complex Variables (II Part).*
10. J. Ben Geloun,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, February 12<sup>th</sup>, 2005,  
*Klauder's Physical Projector of the Schwinger Model in a 1+1 Dimensional Spacetime: a Gauge Invariant Quantum Dynamics without Gauge Fixing.*
11. F. Massamba,  
Seminar of Differential Geometry,  
1<sup>st</sup> Room of the International Chair in Mathematical Physics and Applications, University  
of Abomey-Calavi, February 16<sup>th</sup>, 2005,  
*On Riemannian Geometry: the Geometric Elements of a Riemannian Metric.*
12. J. Ben Geloun,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, February 26<sup>th</sup>, 2005,  
*An Introduction to Noncommutative Field Theory.*
13. J. Ben Geloun,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,

- University of Abomey-Calavi, March 3<sup>rd</sup>, 2005,  
*On a Noncommutative Version of the Schwinger Model and Lorentz Invariance.*
14. F. Massamba,  
 Seminar of Differential Geometry,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, March 16<sup>th</sup>, 2005,  
*Practical Determination of the Christoffel Symbols, Curvature Tensor, Ricci Tensor and Scalar Curvature of the Metrics.*
  15. A. Anjorin,  
 Seminar of Functional Analysis,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, March 25<sup>th</sup>, 2005,  
*Basic Set of Polynomials.*
  16. M. K. Mahaman,  
 Seminar of Partial Differential Equations (PDE),  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, March 26<sup>th</sup>, 2005,  
*On Some Ansatzes Generating Exact Solutions of Nonlinear Evolution Equations: Application to Burger, Fisher and Murray Equations.*
  17. F. Massamba,  
 Seminar of Differential Geometry,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, April 2<sup>nd</sup>, 2005,  
*On Hodge Theory.*
  18. J. Ben Geloun,  
 Seminar of Mathematical Physics,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, April 6<sup>th</sup>, 2005,  
*The Noncommutative Version of the Schwinger Model in the Moyal Plane: the Issue of the Hamiltonian Formalism.*
  19. J. Ben Geloun,  
 Seminar of Differential Geometry,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, April 11<sup>th</sup>, 2005,  
*Isometries and Conformal Transformations, Killing Vector Fields and Conformal Killing Vector Fields.*
  20. A. Anjorin,  
 Seminar of Functional Analysis,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, April 14<sup>th</sup>, 2005,  
*Basic Series Associated with the Basic Set of Polynomials.*

21. M. K. Mahaman,  
Seminar of PDE,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, April 15<sup>th</sup>, 2005,  
*Construction of Exact Solutions of a Diffusion Equation Modeling Brain Cancer Treatment.*
22. E. N. Nkouakam,  
Seminar of Mathematical Physics,  
2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, April 20<sup>th</sup>, 2005,  
*Star Products and Deformation Quantizable Poisson Brackets.*
23. J. Ben Geloun,  
Seminar of Mathematical Physics,  
2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, May 2<sup>nd</sup>, 2005,  
*Basic Properties of the Symmetric Polynomials and Functions.*
24. M. K. Mahaman,  
Seminar of PDE,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, May 4<sup>th</sup>, 2005,  
*Symmetry Groups of Algebraic Equations: Generalities and Adaptation to the Differential Equations.*
25. M. N. Hounkonnou,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, May 9<sup>th</sup>, 2005,  
*On Non Commutative Geometry and Quantum Groups.*
26. F. Massamba,  
Seminar of Mathematical Physics,  
2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, May 11<sup>th</sup>, 2005,  
*Noncommutative Gauge Field Theory in the Light Cone Representation in 2D ( Part I).*
27. A. Anjorin,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, May 15<sup>th</sup>, 2005,  
*Effectiveness of Basic Set of Polynomials: their Regions of Effectiveness.*
28. M. N. Hounkonnou,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,

- University of Abomey-Calavi, May 15<sup>th</sup>, 2005,  
*On Quasideterminants*
29. F. Massamba,  
 Seminar of Mathematical Physics,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, May 18<sup>th</sup>, 2005,  
*Noncommutative Gauge Field Theory in the Light Cone Representation in 2D: Noether's  
 Theorem and the Seiberg Witten Map ( Part II).*
30. E. N. Nkouakam,  
 Seminar of Mathematical Physics,  
 2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, May 21<sup>st</sup>, 2005,  
*On the Gauge Equivalence of Star Product.*
31. M. K. Mahaman,  
 Seminar of PDE,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, May 28<sup>th</sup>, 2005,  
*Application of the Lie Methods for the Reduction of Partial Differential Equations: Ex-  
 ample of the Euler Equations.*
32. M. K. Mahaman,  
 Seminar of PDE,  
 1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, June 10<sup>th</sup>, 2005,  
*Classical, Nonclassical and Potential Symmetries: Application to the Burger's Equation.*
33. A. Anjorin,  
 Seminar of Functional Analysis,  
 2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, June 16<sup>th</sup>, 2005,  
*On the Cannon Conditions.*
34. M.N. Hounkonnou,  
 Seminar of Functional Analysis,  
 2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, June 16<sup>th</sup>, 2005,  
*On Non Commutative Orthogonal Polynomials: General Properties and Construction*
35. E. N. Nkouakam,  
 Seminar of Mathematical Physics,  
 2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
 University of Abomey-Calavi, June 17<sup>th</sup>, 2005,  
*Poisson Algebras of Formal Laurent Series.*

36. F. Massamba,  
Seminar of Mathematical Physics,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, June 22<sup>nd</sup>, 2005,  
*Noncommutative Gauge Field Theory in the Light Cone Representation in 2D: a Gauge Invariance Regularization Procedure for the Energy-Momentum Tensor (Part III)*.
37. M. K. Mahaman,  
Seminar of PDE,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, June 24<sup>th</sup>, 2005,  
*Symmetry Groups and Conservation Laws: a Pratical Version of Noether's Theorem*.
38. A. Anjorin,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, June 27<sup>th</sup>, 2005,  
*On the Improved Whittaker's Constant*.
39. M. N. Hounkonnou,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, July 20<sup>th</sup>, 2005,  
*Noncommutative Orthogonal Polynomials*.
40. E. N. Nkouakam,  
Seminar of Mathematical Physics,  
2<sup>nd</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, August 10<sup>th</sup>, 2005,  
*The Weyl-Moyal-like Deformation of Poisson Algebras of Formal Laurent Series*.
41. A. Anjorin,  
Seminar of Functional Analysis,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, August 16<sup>th</sup>, 2005,  
*Effectiveness of Basic Set of Polynomials: Topological Aspects*.

### 1.5.2 By the members in Africa

1. L. Bla Toh,  
Seminar of Computer Science,  
1<sup>st</sup> Seminar Room of the International Chair in Mathematical Physics and Applications,  
University of Abomey-Calavi, October 22<sup>th</sup> - October 31<sup>th</sup>, 2005,  
*Security in Using Micro-Computer, Advanced Manipulation in Word Processing and Data Shift*.

### 1.5.3 By the members outside Africa

1. J. Govaerts,  
Seminar of Mathematical Physics,  
First International COPROMAPH School, University of Abomey-Calavi, October 31<sup>st</sup>-  
November 4<sup>th</sup>, 2005,  
*Quantum Mechanics and Fields for Physicists and Mathematicians, Strings before the  
1995 Revolution.*
2. J. Govaerts,  
Grand Public Conference in the Framework of the World Year of Physics,  
Institut de Sciences Bio-Médicales Appliquées (ISBA), Cotonou, November 2<sup>nd</sup>, 2005,  
*Einstein, Architecte de l'Univers: Cent Années de Physique pour le XXI<sup>ème</sup> Siecle .*
3. S. T. Ali,  
Seminar of Mathematical Physics,  
Institut de Mathématique et de Sciences Physiques, University of Abomey-Calavi, Novem-  
ber 14<sup>th</sup>- November 18<sup>th</sup>, 2005,  
*Lectures on Techniques of Quantization.*
4. to be completed

## 1.6 PARTICIPATION TO INTERNATIONAL CONFERENCES AND WORKSHOPS

### 1.6.1 By the members in Benin

1. L. Gouba, J. Govaerts and M. N. Hounkonnou,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
Cotonou (Benin), November 5th - November 11th (2005),  
*2 Dimensional N Flavour Massless Schwinger Model: Realization of Non Abelian Global  
Symmetries.*
2. H. Houna and M. N. Hounkonnou,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
Cotonou (Benin), November 5th - November 11th (2005),  
*Laguerre - Freud Equations for the Recurrence Coefficients of Discrete Semi-Classical  
Orthogonal Polynomials of Class 2..*
3. J. Ben Geloun, J. Govaerts and M. N. Hounkonnou,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
Cotonou (Benin), November 5th - November 11th (2005),  
*Some Aspects of the Bosonization of the Schwinger Model by a Noncommutative Chiral  
Boson.*
4. M. M. Kabir and M. N. Hounkonnou,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,

November 5th - November 11th (2005),  
*Analytical Solution of a Generalized Nonlinear Reaction - Diffusion Equation.*

5. A. Anjorin and M. N. Hounkonnou,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
November 5th - November 11th (2005),  
*Basic sets of Polynomials: General Overview.*
6. A. Anjorin and M. N. Hounkonnou,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
November 5th - November 11th (2005),  
*Basic sets of Chebychev Polynomials: Topological Aspects.*
7. K. Sodoga, M. N. Hounkonnou and G. debiais,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
November 5th - November 11th (2005),  
*Exact Solutions of Sturm - Liouville Differential Equations: Potential Group Method.*
8. M. N. Hounkonnou, F. Massamba and J. Ben Geloun,  
XXIV WGMP, Bielowieza (Poland), June 25th -July 2,  
*2-Dimensional Noncommutative Field Theory on the Light Cone.*
9. J. Ben Geloun,  
First International School on Contemporary Problems in Mathematical Physics, Cotonou  
(Benin) October 31st - November 4th (2005).
10. M.M. Kabir,  
First International School on Contemporary Problems in Mathematical Physics, Cotonou  
(Benin) October 31st - November 4th (2005).
11. A. Anjorin,  
First International School on Contemporary Problems in Mathematical Physics, Cotonou  
(Benin) October 31st - November 4th (2005).
12. M. N. Hounkonnou,  
First International School on Contemporary Problems in Mathematical Physics, Cotonou  
(Benin) October 31st - November 4th (2005).
13. Ezinvi Baloïtcha,  
First International School on Contemporary Problems in Mathematical Physics, Cotonou  
(Benin) October 31st - November 4th (2005).
14. Ezinvi Baloïtcha,  
Fourth International Workshop on Contemporary Problems in Mathematical Physics,  
Cotonou (Benin) November 5th - November 11th (2005).

### 1.6.2 By the members outside Africa

1. *See ICMIPA Scientific Report for 2004 - 2005*

## 1.7 PH.D. THESIS SUPERVISED AND DEFENDED 2005

### 1.7.1 By the members in Benin

- M.N. Hounkonnou:

1. C. Hounnga,  
*Sur de Nouvelles Familles de Polynômes Orthogonaux*,  
Université d'Abomey-Calavi.
2. E. S. Azatassou,  
*Sur les  $D_{q,\omega}$  Polynômes Orthogonaux Semi-Classiques*,  
Université d'Abomey-Calavi.
3. J. Ben Geloun (with J. Govaerts, co-supervisor),  
*Modèle de Schwinger dans un Espace-Temps 1+1 non Commutatif*,  
Université d'Abomey-Calavi.
4. A. Anjorin,  
*On Basic Sets of Polynomials*,  
Université d'Abomey-Calavi.
5. F. Guédjé (with G. Débiais, co-supervisor),  
*On Optical Parameter Determination of the Atmosphere from a LIDAR Signal*,  
Université d'Abomey-Calavi and Université de Perpignan.
6. M. M. Kabir (with B. Somé, co-supervisor),  
*Contribution à la Modélisation du Cancer du Cerveau*,  
Université d'Abomey-Calavi.
7. L. Gouba (with J. Govaerts, co-supervisor),  
,  
PhD thesis defended, November 9th, 2005, Université d'Abomey-Calavi (Benin).
8. K. sodoga,  
*Sturm - Liouville Differential Operators: Factorization and Solvable Potentials*,  
PhD thesis defended, November 9th, 2005, Université d'Abomey-Calavi (Benin).

- A. Afouda:

1. E. C. Lawin

### 1.7.2 By the members outside Africa

- S. T. Ali:

1. G. Honnouvo,  
*On Discrete Wavelets: Theory and Applications*,  
Concordia University.
2. Tamara Diaz Chang (with V. Hussin, co-supervisor), *Coherent States from the Jaynes Cummings Model*, Université de Montréal.

- J-P. Antoine:
  1. Samuel GISSOT,  
*Analyse du Mouvement dans les Séquences d'Images EUV de la Couronne Solaire.*
  2. Samira BISKRI (UST H.Boumedir), Alger),  
*Techniques d'Analyse en Ondelettes et Applications en Géophysique.*
  3. Eddy-Evian NTIRWIHISHA (U. du Burundi),  
*Analyse en Ondelettes et Applications à la Séismologie.*
- J. Govaerts:
  1. Emilie Burton,  
*Evaluation numérique automatisée de diagrammes de Feynman à une et deux boucles,*  
Université catholique de Louvain (Louvain-la-Neuve, Belgium).
  2. Damien Bertrand,  
*Champs électromagnétiques et théorie de Ginzburg-Landau relativiste pour les supra-*  
*conducteurs nanoscopiques: une extension covariante relativiste de la théorie BCS*  
*scalaire,*  
Université catholique de Louvain (Louvain-la-Neuve, Belgium).
  3. Florian Payen,  
*Dynamique non perturbative et topologie en électrodynamique quantique à 2+1 et*  
*3+1 dimensions,*  
Université catholique de Louvain (Louvain-la-Neuve, Belgium).
  4. Bruno Bertrand,  
*Topologie et dynamique non perturbative en Théories de Maxwell-Chern-Simons*  
*supersymétriques à 2+1 dimensions,*  
Université catholique de Louvain (Louvain-la-Neuve, Belgium).
  5. Jonathan Delepine,  
*Constante cosmologique et gravitation quantique,*  
Université catholique de Louvain (Louvain-la-Neuve, Belgium).
  6. Laure Gouba (with M.N. Hounkonnou, co-supervisor),  
*Théories de jauge en dimension deux,*  
PhD thesis defended, November 9th, 2005, Université d'Abomey-Calavi (Benin).
  7. Joseph Ben Geloun (with M.N. Hounkonnou, co-supervisor),  
*Modèle de Schwinger dans un espace-temps de dimension 1+1 non commutatif,*  
Université d'Abomey-Calavi.

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## 1.9 VISITING SCIENTISTS FROM ABROAD

1. Prof. J. Govaerts, (Catholic University of Louvain, Louvain-la-Neuve, Belgium).
2. Prof. S. T. Ali, (Concordia University, Montreal, Canada).
3. Prof J. Gates. (Maryland University, USA).
4. Prof. S. Dossou-Gbété, (Université de Pau, France).
5. Prof. G. Débiais, (Université de PerpignanFrance).
6. Prof. K. Tchakpélé, (Université de Lome, Togo).
7. Prof. T. Assih, (Université de Lome, Togo).
8. Dr D.Lauvergnat, (Université Paris Sud XI, France).
9. Prof.J-P Antoine, (Catholic University of Louvain, Belgium).

10. Prof. R. De Mello Kock, (South Africa).
11. Prof. G. Goldin. (Rutgers University, USA)
12. Prof. F. Lahlou, (University of Fes, Morocco).
13. Prof. H. V. Mweene, (University of Zambia, Zambia).
14. Prof. G. Munyene, (University of Zambia, Zambia).
15. Prof. K. Kangni, (University of Cocody, Ivory Cost).
16. Prof. E. Ligan, (University of Cocody, Ivory Cost).

## **1.10 NEW COLLABORATIONS**

A collaboration agreement has been initiated, during the stay (September - October 2005), of Professor Bla Toh, Director of the the Institut de Recherches Mathématiques (IRMA) of Ivory Cosat at the ICMPA, between the IRMA and the ICMPA. It concerns the development of common PhD training programs and Professional Master degree programs as well as the visiting research program.

## **2 FINANCIAL REPORT**

### **2.1 ICMPA GRANTS PROGRAMME FOR UNDERGRADUATE STUDENTS 2005**

This programme intends to help the best undergraduate students with limited means and who need assistance to pursue their studies in African Universities. For 2005, this programme has permitted to support 6 students of the Université d'Abomey-Calavi. The 2005 fellows are:

1. Alia Didier Yelognissé (Benin);
2. Anago E. K. Romual (Benin);
3. Faton Elfried Grita Fifa (Benin);
4. Godonou S. Parfait (Benin);
5. Houngbénon Parfait (Benin).

The ICMPA Grants Programme for Undergraduate Students (The ICMPA-GPUS) is currently sponsored by Professor Odon Vallet Foundation (France).

## 2.2 ICMQA RESEARCH FELLOWSHIPS 2005

In 2005, four PhD students have been selected to be granted by the International Abdus Salam Centre for Theoretical Physics (ICTP) under the contract ref: Prj-15, for a maximum of three years. The following selected PhD students are:

1. Ben Geloun Joseph (from Senegal);
2. Mahaman Kabir Mahaman (from Niger);
3. Anjorin Aderibigbe (from Nigeria);
4. Ngompe Nkouankam Elvis (from Cameroon).

Their registration fees have been also partially supported by the Daniel Iagolnitzer Foundation (Fondation de France).

Let's notice that Mr Hounga Comlan (from Benin), initially selected to benefit of this ICTP grant has succeeded in obtaining a fellowship from other institution. This explains why he was replaced by Mr Ngompe Nkouankam Elvis by the selection committee.

Besides, two young PhD have been selected in post-doctoral positions at the ICMQA, supported by ICTP under the same contract for two years plus one. The beneficiaries are the following:

1. Dr Baloitcha Ezinvi (from Benin);
2. Dr Massamba Fortuné (from Congo-Brazzaville).

Besides, Dr Hubert Onibon (from Benin) has benefited of a postdoral position, financed by the Institut de Recherche pour le Développement (IRD, France)

The stay at the ICMQA of the following researchers:

1. Professor Bla Toh (from Ivory Cost)
2. Professor Twareque S. Ali (from Canada)
3. Professor Jan Govaerts (from Belgium)

has been partially sponsored by the Daniel Iagolnitzer Foundation.

Finally, limited actions have been developed in benefit of Ph.D students of the Institut de Mathématiques et de Sciences Physiques and local researchers from University of Abomey-Calavi. These actions have mainly consisted in providing computer facilities and technical support.

## 2.3 ICMQA TRAINING PROGRAMS 2005

The ICMQA training programs have been financed, in terms of grants for students, in 2005 by the following sponsors:

1. UNESCO;

2. Service de Cooperation et d'Action Culturelle (SCAC, French Embassy, Cotonou)

The following students have been granted in 2004 - 2005:

For UNESCO grants:

1. Afouda Eric (Benin) and
2. Nounawon Parfait (Benin);

For SCAC grants :

1. Alamou Eric (Benin).

## **2.4 Schools and Workshops**

The First COPROMAPH International School (October 31<sup>st</sup> - November 4<sup>th</sup>, 2005) and the Fourth COPROMAPH International Workshop (November 5<sup>th</sup> - November 11<sup>th</sup>, 2005) have been sponsored by the following institutions:

1. The International Abdus Salam Centre for Theoretical Physics (ICTP), Trieste (Italy);
2. IHES-Schlumberger Foundation Program (France);
3. The UNESCO-US State Department through the International Basic Science Programme (IBSP) under the Contract No: 4500026474
4. The Agence Universitaire Francophone (AUF);
5. Local sponsors, the ICMIPA and Benin Government provide technical support, cars and bus for participant transportation, and partial living costs