



ICCA10 Schedule

Tartu, 4–9 August 2014



10th International Conference on Clifford Algebras and their Applications in Mathematical Physics

MONDAY, AUGUST 4

- Lecture room 111
 09:00 **Registration**
 10:00 **Opening ceremony**
 10:15 **David Eelbode** *Transvector algebras in Clifford analysis*
 11:15 **Coffee break**
 11:45 **Eckhard Hitzer** *Quaternion Domain Fourier Transformation*
 12:45 **Lunch break**
- Lecture room 403
Quaternion and Clifford Fourier Transforms and Wavelets 2
 15:00 **Martin Reinhardt** *Monogenic Signals, Riesz Transform and Quaternions for Image Processing*
 15:30 **Tim Raeymaekers** *Properties of the Clifford Fourier transform for color image processing*
 16:00 **David Eelbode** *Operator exponentials for the Clifford-Fourier transform*
 16:30 **Coffee break**
Discrete and Continuous Quaternionic and Clifford Analysis
 17:00 **Swanhild Bernstein** *Riesz transforms in image processing and optics*
 17:30 **Isabel Cacao** *Quaternionic Zernike Spherical Polynomials*
 18:00 **Roy Oste** *Unique characterization of the Fourier transform and generalized transforms*
 18:30 **Lander Cnudde** *Slice monogenic functions: algebraic approach and associated Clifford-Fourier transform*
- Lecture room 404
Conformal structures and conformal spin structures
Pierre Anglès *The Odyssey of Geometric Algebras*
Jacques Helmstetter *Conformal Groups and Vahlen Matrices*
Arturas Acus *Calculation of eigens with geometrical algebra rotors*
Coffee break
General session 1
Jaroslav Hrdina *Geometry of almost Cliffordian manifolds*
Patrice Ntumba *Filtered Clifford A-algebras and orthogonal sums*
Yue Liu *Basis-Free Quaternionic or Clifford Polynomial Manipulations: Mathematical Completeness*
Dmitry Shirokov *The method of contractions in Clifford algebras*

TUESDAY, AUGUST 5

- Lecture room 111
 09:00 **Daniel Alpay** *Schur analysis in the quaternionic setting*
 10:00 **Irene Sabadini** *Some function spaces in the slice hyperholomorphic setting*
 11:00 **Coffee break**
 11:30 **Pierre Anglès** *Real projective quadrics, conformal structures and conformal spin structures*
 12:30 **Lunch break**
- Lecture room 403
Discrete and Continuous Quaternionic and Clifford Analysis
 14:00 **Sirkka-Liisa Eriksson** *Cauchy type integral formulas for k -hypermonogenic functions*
 14:30 **Heikki Orelma** *Vekua systems in Hyperbolic Harmonic Analysis*
 15:00 **Vesa Vuojamo** *Hyperbolic function theory in the plane*
 15:30 **Helmuth Malonek** *Recurrence formulae for sequences of monogenic polynomials*
 16:00 **Coffee break**
 16:30 **Hendrik De Bie** *The kernel of the Dunkl Dirac operator as a module for the Bannai-Ito algebra*
 17:00 **Fabrizio Colombo** *Some results on the F -functional calculus*
 17:30 **Matthias Roels** *Scalar higher spin operators in Clifford analysis*
 18:00 **Michael Wutzig** *Reproducing kernels in hermitian Clifford analysis*
 18:30 —
 19:00 —
- Lecture room 404
General session 2
Waldyr Rodrigues *Notes on Conservation Laws, Equations of Motion of Matter Fields, Lie Derivative of Spinor Fields in Lorentzian and Teleparallel de Sitter Spacetime Structures*
Vladimir Dzhunushaliev *Nonassociative generalization of supersymmetry*
Valeriy Dvoeglazov *Energy-Momentum Tensor in Electromagnetic Theory and Gravitation from Relativistic Quantum Equations*
Kelvyn Brito *The non-anticommutative supersymmetric Wess-Zumino model*
Coffee break
Anthony Lasenby *$f(R)$ theories and Gauge Theory Gravity*
Murat Tanisli *Electromagnetic Energy Conservation with Octon*
Rogério Cavalcanti *VSR symmetries in the DKP algebra: the interplay between Dirac and Elko spinor fields*
Ott Vilson *Scalar field redefinition freedom in scalar-tensor gravity*
Rolf Dahm *On a Microscopic Representation of Spacetime*
- Lecture room 405
From Signals to Consciousness using Clifford and Geometric Algebras
 14:00 **David Hestenes** *Electrodynamics of Electrons and Brains*
 15:00 **Steven Lehar** *Geometric Algebra: A Unique Window on the Inner Workings of Mind in Perception and Visual Consciousness*
 16:00 **Coffee break**
 16:30 **Elio Conte** *On the Primitive Elements of Cognition and Consciousness explained in a Clifford algebraic formulation of Quantum Mechanics.*
 17:30 **Eduardo Bayro-Corrochano** *Geometric Perception of Pose and Tracking*
 17:50 **Joan Lasenby** *Using Geometric Algebra to determine a set of consistent rotations from multiple local observations*
 18:10 **Eduardo Bayro-Corrochano** *Geometric Entities Voting Schemes Using the Conformal Geometric Algebra Framework*
 18:25 **Eduardo Bayro-Corrochano** *Lie Group Motor EKF*
 18:40 **Serdal Sahin** *A New Expression for Higher Order Accelerations and Poles under the One Parameter Planar Hyperbolic Homothetic Motions*
 19:00 —



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WEDNESDAY, AUGUST 6

10:00–17:00 **Excursion**
19:00–22:00 **Conference dinner and W. K. Clifford Prize ceremony** at restaurant *Atlantis*

THURSDAY, AUGUST 7

Lecture room 111
09:00 **Carlos Castro Perelman** *Novel Physical Consequences of Clifford Space Relativity Theory*
10:00 **Klaus Guerlebeck** *On Ψ -hyperholomorphic functions*
11:00 **Coffee break**
11:30 **Uwe Kaehler** *Fractional Clifford Analysis*
12:30 **Lunch break**

Lecture room 403 Discrete and Continuous Quaternionic and Clifford Analysis 14:00 Paul Leopardi <i>The abstract Hodge-Dirac operator and its stable discretization</i> 14:30 Hilde De Ridder <i>Fueter's theorem in discrete Clifford analysis</i> 15:00 Dmitrii Legatiuk <i>Theoretical aspects of coupling of function theoretic methods and finite element method</i> 15:30 Irene Sabadini <i>Approximation properties for functions of a quaternionic variable</i> 16:00 Coffee break 16:30 Paula Cerejeiras <i>Local solvability of the quaternionic inhomogeneous Beltrami equation</i> 17:00 Antonio Di Teodoro <i>Necessary and Sufficient Conditions for Associated q-generalized Differential Operators in Quaternionic Analysis and Applications to Initial Value Problems</i> 17:30 Dixan Peña Peña <i>Special functions and systems in Hermitian Clifford analysis</i> 18:00 Paul Leopardi <i>Software presentation - FEniCS and GluCat/PyClical</i> 18:30 20:00 Math in Motion: <i>A program of short mathematical films</i> 21:15	Lecture room 404 Geometric Algebra and Calculus in the Standard Model of Particle Physics Introductory discussion Introductory discussion continues Claude Daviau <i>Gauge group of the standard model in $Cl_{5,1}$</i> Cohl Furey <i>Charge Quantization from a Number Operator</i> Coffee break Thierry Socroun <i>Clifford to unify General Relativity and Electromagnetism</i> Piotr Zenczykowski <i>From Clifford Algebra of Nonrelativistic Phase Space to Quarks and Leptons of the Standard Model</i> Jose G. Vargas <i>$U(1) \times SU(2) \times SU(3)$ from the Tangent Bundle</i> Igor Kanatchikov <i>On the structure of Standard Model from the point of view of pre-canonical quantization</i>	Lecture room 405 Geometric Algebra in the High School and Undergraduate Curriculum Ramon Gonzalez Calvet <i>How to Explain Affine Point Geometry</i> Charles Gunn <i>Euclidean Plane Geometry using Projective Geometric Algebra</i> David Hestenes <i>A Primer on Geometric Algebra</i> John Snygg <i>Proper rotations for cube and tetrahedron</i> Coffee break Panel discussion <i>Introducing Geometric Algebra into the High School and Undergraduate Curriculum</i> Panel discussion continues
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FRIDAY, AUGUST 8

Lecture room 111
09:00 **Charles Gunn** *Geometric algebras for euclidean geometry*
10:00 **G Stacey Staples** *Operator Calculus on Clifford Algebras: Combinatorics to Quantum Probability*
11:00 **Coffee break**
11:30 **Jose G. Vargas** *Helmholtz-Hodge Theorems: Unification of Integration and Decomposition Perspectives*
12:30 **Lunch break**

Lecture room 403 General session 3 14:00 Alexandre Trovon de Carvalho <i>Galois Theory for Clifford Analysis and Applications to Quark Physics</i> 14:30 Osamu Suzuki <i>A Clifford algebraic method for the knot structures of 3D-Ising model (Zhang's conjecture)</i> 15:00 Viktor Abramov <i>Triple Systems, Generalized Cohomologies and Connection</i> 15:30 Md. Raknuzzaman <i>Graded q-dimensional matrix algebra</i> 16:00 Coffee break 16:30 Charles Gunn <i>Projective Geometric Algebra Tutorial</i> 18:30	Lecture room 404 Geometric Algebra and Calculus in the Standard Model of Particle Physics Gene McClellan <i>A Laboratory-Frame View of the Dirac Electron Field Using Geometric Algebra</i> Nikolay Marchuk <i>One spectral property of Yang-Mills operator</i> Closing discussion Closing discussion continues Coffee break	Lecture room 405 General session 4 Pierre-Philippe Dechant <i>Platonic solids generate their four-dimensional analogues</i> Rimvydas Krasauskas <i>Clifford-Bezier parametrization of Dupin cyclide patches with applications to molecular surface modeling</i> John Snygg <i>Martin Bartels</i> — Coffee break
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SATURDAY, AUGUST 9

Lecture room 111
09:00 **Oliver Conrads** *Projective Algebra A_n*
10:00 **Igor Kanatchikov** *Precanonical quantization, quantum gravity and Clifford analysis*
11:00 **Coffee break**
11:30 **Closing**
12:00