



# ICCA10 Schedule

# Tartu, 4–9 August 2014



## 10<sup>th</sup> 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 functions 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 —



# ICCA10 Schedule

## Tartu, 4–9 August 2014



### 10<sup>th</sup> International Conference on Clifford Algebras and their Applications in Mathematical Physics

#### 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  $\Psi$ -hyperholomorphic functions*  
 11:00 **Coffee break**  
 11:30 **Uwe Kaehler** *Fractional Clifford Analysis*  
 12:30 **Lunch break**

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

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

#### 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