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Gudrun Kalmbach H.E.

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Katalog MINT 1990-2017
Inhalte und Vorworte mit Kommentaren der **MINT (Mathematik, Informatik, Naturwissenschaften, Technik)** Buchserie mit ISBN Nummern.
Chefeditorin: Gudrun Kalmbach H.E., Coautoren sind bei den einzelnen Büchern aufgeführt.

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Die MINT Buch Serie entstand ab 1997 durch die Initiative der Autoren Martin Grimm und Otto Lange. Sie basiert auf dem ersten deutschen MINT Bildungsprogramm, das Gudrun Kalmbach H.E. 1984 begann. Ihre erste Dokumentation waren die zwei Bücher *Talent Development I, II 1990*. Unterlagen zur MINT Serie stammen aus der Kursarbeit mit Schülern der 12. gymnasialen Klassenstufe, die im wesentlichen mit von Prof. Dr. Ludger Kaup, Universität Konstanz,

mitgetragen wurde. Die nicht im Buchhandel erhältlichen Kursbände für die Teilnehmer dienten als Vorlage für viele Artikel in der MINT Serie. Die Coautoren der Kursbände sind in mehreren Jahren dieselben und werden meist nur bei der erstn Teilnahme zitiert: 1985 Manfred Hild, Rüdiger Paschotta; 1986/87 Friedrich Decker, Stefan Hofmann, H.-J.Stoß, H.-J. Wall; 1988 W. Grundgeier und in Bonn 1988 Bildung und Begabung; 1989 Wolfgang Mack; 1990 Manfred Hild; 1991-94 Michael Keßler, Martin Grimm, Frank Houdek; 1996-99 Pascal Hitzler, Frank Houdek, Katharina Schmithüsen; 2000/01 Pascal Hitzler. Ein Kurzbericht zum letzten Kurs wird angefügt. Später unterrichtete Gudrun Kalmbach alleine und nur in Kleingruppen 2-3 Schüler. In den Jahren 1990er Jahren fand jährlich einmal ein Programmierwettbewerb statt, dessen verantwortliche Aufgabenstellung meist von Frank Houdek stammt; ausserdem leitete Gudrun Kalmbach lokale Kurse mit Wochenendunterricht in 10-14 Treffen. Das Thema war aus den Naturwissenschaften Biologie, Chemie, Physik und der Informatik. Mitgearbeitet haben in diesen Jahren - alphabetisch angeordnet - Brigitte Böhm, Fritz Kalmbach, Stefan Knupfer, Beate Scheffold, Emil Schumacher, Silke Siegert. Berichte und Artikel aus dieser MINT Arbeit sind auch in der MINT Buch Serie erschienen.

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Schülerwettbewerbe–Talentförderung

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10.9.2001

Bericht für den Emmy-Noether-Verein, Kurs 2001

Sehr geehrte Damen und Herren,

an meinem letzten IKM nahmen 7 Schüler und 2 Schülerinnen teil. Ch. Ciesla und Ch. Mendl sahen sich unsere Räume schon am Samstag, 1.9.2001, an, und übernahmen die Betreuung der Gruppe im PC-Pool. Am 2. 9. 2001 hielt ich nachmittags und auch an den Folgetagen Vorträge zur *Diskreten Mathematik* [3], Funktionentheorie und meiner *Conception of the World.* Die Liste der mündlichen Präsentation der Schülerreferate, die in Kopie an alle Teilnehmer verteilt wurden, ist:

Ch. Ciesla und Ch. Mendl, *3D-Grafik und Raytracing*

T. Eberle, *Komplexe Zahlen*

T. Fiesel und S. Mack, *Codierung*

S. Flek und D. Lohner, *Schwarze Löcher und kosmologische Systeme*

R. Jenni, *Projektive Geometrie*

M. Weckerle, *Vollständige Induktion und Anwendungen*

Ferner hielt Professor Dr. Anatolij Dvurečenskij zwei Vorträge mit dem Titel

Aus der Geschichte der Mathematik.

Maße und Wahrscheinlichkeiten.

Ein weiterer Vortrag zum Thema

Aus der Biologie: Meerestiere.

wurde von Prof. Dr. Dieter Waloßek gehalten. Es fanden Computer-Demonstrationen statt und es wurde täglich im PC-Pool 2 Universität Ulm-West gearbeitet. Ferner war eine längere Periode des selbständigen Arbeitens dem *Lösen mathematischer Probleme* gewidmet. Begleitend gab es eine Einführung in die Benutzung der Universitätsbibliothek und Freizeitaktivitäten, wie z.B. Musizieren am Montagabend [8] mit Prof. Dvurečenskij. Im Anschluss an den Kurs wurden zwei Vorträge gehalten:

Professor Dr. Otto Lange:

Auswege aus zwei Schwierigkeiten für Mädchen und Frauen in Mathematik.

und

Professor Dr. Karin Richter-Häsler:

Historische Zeichengeräte im Mathematikunterricht? Überlegungen am Beispiel des Pantographen.

Literatur

[1] G. Fischer, *Analytische Geometrie*, Vieweg, Braunschweig, 1983

[2] S. Harrington, *Computergrafik*, McGraw-Hill, Hamburg, 1987

[3] G. Kalmbach, *Diskrete Mathematik*, Vieweg, Wiesbaden, 1988

[4] G. Kalmbach, *Quantum measures and spaces*, Kluwer Acad. Publ., Dordrecht, 1998; MINT Vol. 3,5 1999 and `www.uni-um.de/~gkalmbac` (There is no claim that this model, constructed for computer experiments, is physical reality.)

[5] G. Kalmbach H.E. et al, *Skript Kurs Physik*, Universität Ulm, 1997

[6] Peitgen et al, *The Beauty of Fractals*

[7] Pennisi, *Elements of Complex Variables*

[8] Volkslieder

Mit freundlichen Grüßen

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MINT-WIGRIS

Volume I-II

Gudrun Kalmbach H. E.

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Book: Gudrun Kalmbach H.E., MINT-WIGRIS, MINT Verlag,
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The book has evolved from the authors research since 1969. The WIGRIS model is described in chapters 1-3 and 11. From the book Orthomodular lattices, chapter 7 is a short report. Chapters 4,5,6,8,10,14,15 are essentially from the book Quantum Measures and Spaces. Chapter 9 is from the book Mathematik - bunt gemischt II. The help-text from the internet animation of 2000 was in `www.uni-ulm.de\~gkalmbac` *and is repeated in chapter 12. The other chapters are from the authors lectures and research. They present a mathematical unification of the four basic interactions in physics with Einstein metrics for the nano range.*

The world is an octonian vector space, doubling the spacetime coordinates of physics. An energy bifurcation arises from decaying Higgs bosons as input, - the octonian identity, - which generate first quarks, then the Heisenberg uncertainty relations, the strong interaction, a heat chaos and the weak interaction. Light is an output from atoms as seventh octonian generator. Spacetime arises as the first to fourth octonian generators and an Einstein energy plane for frequency and mass uses the fifth and sixth octonian generators. A dynamical geometry for nucleons and atomic kernels sets also gravity and the Einstein metrics. The experimentally found graviton waves are here described as rgb-graviton whirls, the nucleons neutral color charge red, green, blue of three quarks carrying energy vectors. The new symmetry added are the Moebius transformations, acting on nucleons bounding spheres. For measurements in physics Gleason operators are introduced which carry weights like mass, vectors and local coordinates.

WIGRIS presents a unification of all four basic forces from physics on the basis of field superpositions, available for atoms. It was a wish of Einstein, also to put the results of quantum physics on a field description. This is mathematical possible by using an 8-dimensional octonian space with a Higgs input field for gravity, with electromagnetism, both bifurcating with a logical evolution equation after a high speed collision (like that for Higgs bosons in CERN) into six energy fields and the three forces of the standard model SM. For nucleons they have localizing superpositions like that of two orthogonal hitting frequencies, generating locally rotating Lissajous figures. The three Heisenberg uncertainties pair the fields as in the figure hedgehog and provide three WIGRIS quantizations: To the standard model SM are added localized projective normed complex 2-dimensional (strong interaction) spaces for an inner spacetime of nucleons with a bounding 2-dimensional Riemannian sphere S^2. On S^2 the Moebius transformations MT act which include the

Pauli spin matrices. They are added to SM as new symmetry, as well as seven octonian Fano lines for triples like the spin coordinates (S_x, S_y, S_z), generating Gleason operators for measures and metrics. Space with the Euclidean metric is only one of them. The choice of three permuted reference poles 0,1,∞ on S^2 generates through six cross ratios together with a fourth variable z the symmetry group D_3 of a quark triangle. The spin quantization for Bohr radii with natural numbers starts with setting two D_3 members equal and solving numerically for z the polynomial PE equation. For spin it is the degenerate orbit 1/2, 1, 2 as length for fermions, bosons and rgb-gravitons (the neutral color charge of three quarks in a nucleon). The angle-angular momentum quantization for angles QA is using a Higgs compass as 1 cooroll mill, splitting in half for rgb-graviton whirls.
The time quantization for time-energy QT is obtained by a cubic PE equation, extended to the sixth roots of unity (using the scaled Einstein general relativity MT G of order 6) on a circle C, where a special arrangement of six proton plus neutron quarks in deuteron or an atomic kernel is C rotated in discrete time intervals such that twice in the cycle the weak isospin T_3 position at the left of a horizontal spin axis is changed. The two nucleon states for a proton and a neutron differ by the third weak isospin coordinate T_3 in up or down direction.
The last HU position-momentumis taken from physics as first quantization for matter waves.

The D_3 symmetry axes are for permutations of 1,2,3 and generate six conic rotations about the edges of a nucleon triangle which is time QT synchronized for integrations as before and generates a harmonic color charge oscillation by a rotating blue quark vector as an angular frequency QA quantization, introducing differentiation. Field integrations, - like that of a magnetic field passing through a rotating circular area (here a quark triangle) inside an electrical current, - generate six properties of a nucleon. When D_3 is extended to $D_3 \times \mathbb{Z}_2$, a group of order 12 using the charge conjugation operator C from physics of order 2, this group is isomorphic to that generated by G and the scaled special relativistic factor MT matrix M of order 2. They generate the 12 series of fermions.

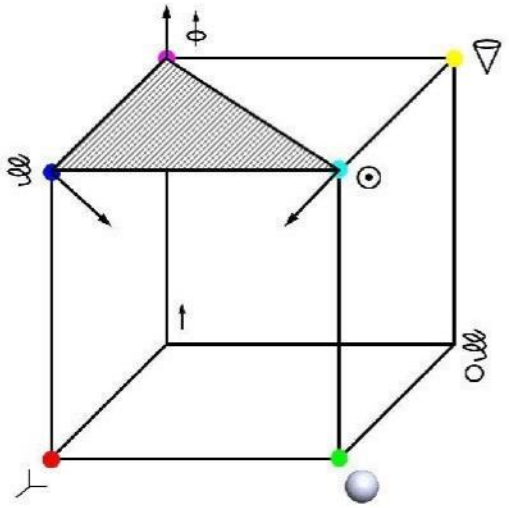
During a century physics had great success with experiments concerning particle physics. In the nano world surprising facts have been discovered. In the WIGRIS axiomatic we incorporate part of different axiomatic theories from modern physics and add new mathematical structures to it. This is necessary in order to get a compiled geometry and theory for the present days nano range findings.
We don't claim that our model is the final answer to facts from physics which are to be verified by experiments with repetitions possible at any future time. However we claim consistency of our model which is not present in other approaches. A generally accepted unified version for all basic four interactions of physics is not published up to now. In this respect our model is a mathematical model how this could work.

The WIGRIS concept is here renewed and has been published in shorter articles during the years 1987-2016. It includes finite-dimensional Hilbert space

theory, its operator theory, symmetry groups for the particle series, together with the spaces they generate. Relativity is included and used in a suitable version for a new black hole model, producing the big bang. A big bang energy and gravitational structure is assumed. Non-commutative measure theory guides the measurable datas and modify some classical concepts. Classical limits however are not or rarely discussed, they are (in our opinion) well understood in physics. The concept of mass is treated differently as weights (or associated inertial mass-vectors) through the weights from a higher-dimensional measuring Gleason-operator, using three complex coordinates. The functions are partly non-linear, but operators are linear matrix-operators in affine or projective spaces. Projections from a n-dimensional space into another one of higher or lower dimension give sometimes observables, while the original systems (for instance complex Gleason-operators for mass-systems) are not observables. Examples of this kind from quantum mechanics are for instance the complex Schrödinger waves ψ as 1-dimensional subspaces of an infinite-dimensional Hilbert space which are not observables, but only their probability distribution $\psi\psi^*$ is in spacetime $\mathbb{R}^4$ observable.

We develop the higher-dimensional theory of bags for systems, using the toroidal SU(3)-geometry $S^3 \times S^5$. The (scaled) spin 1 or $\frac{1}{2}$- theory of Pauli for the 3-dimensional sphere S^3 which belongs to ordinary spacetime $\mathbb{R}^4$ is old, our theory for gravitons, which as particles are not experimentally found up to now, using rgb Gleason-operators, is new. Also Gleason measures, an inner projective nucleon space and the nucleon group D_3 of order 6 is new. Our functions or projections for blow- up/down space structures involved allow us to explain unsolved facts from physics, unifying the four basic forces with Einstein metrics.

Most figures are found in a separate part III volume where also the index is found. It allows in the e-book version the reader to klick on an index word such that an internet article for its further explanation can be read.



octonian vector space with 3-dimensional extensions of vertices: red for euclidean space, green for ball boundaries (volumes), vector e0 for setting energy vectors and fields, helix as exponential extension of a periodic function, upper vertices: blue frequency/linear momentum, turquoise mass barycenters, magenta for rotational momentum (for a nucleons rotor), yellow for magnetic momentum/field quantum as (spin-)rotating cone

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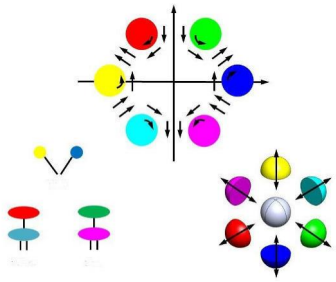
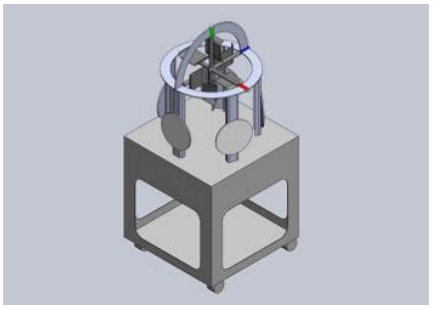
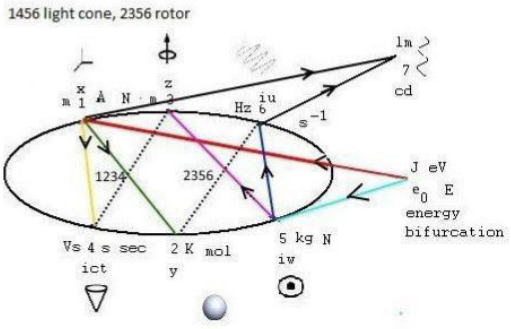


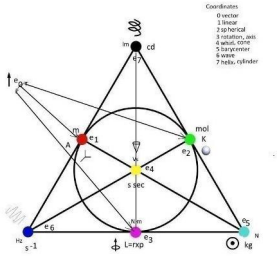
3 motors gravity (lower left), strong interaction (lower middle), weak interaction (middle left), hedgehog energy exchange of a nucleon with the environment (lower right 6 color charge energies), upper flat version as dynamical rotor (inner flow)



spin *x,y,z* coordinate generation for space



six energies evolution from Higgs bosons (input), two mass, electrical potentials and charges; kinetic, rotational, magnetic energy, heat, light 7 as output



7 octonian Gleason measures and spaces drawn as Fano lines for 3 dimensions as points on a line (space) 123 (as circle), 145, 167 (light), 246, 247, 347, 356 (rotor), octonian vector space generators: e0 (at left), e1 (red) e2 (green), e3 (magenta) as space xyz (123 line), e4 time (yellow), e5 (turquoise), e6 frequency (blue), e7 complex cylindrical light helix (black)

The book has evolved from the authors research on Quantum Structures since 1969.

The WIGRIS model is described in chapters 1–3 and 11. Chapter 7 is from the book ***Orthomodular lattices***. Chapters 4,5,6,8,10 are essentially from the book ***Quantum Measures and Spaces***. Chapter 9 is from the book ***Mathematik – bunt gemischt***. The helptext in chapter 12 is from the internet animation of 2000.

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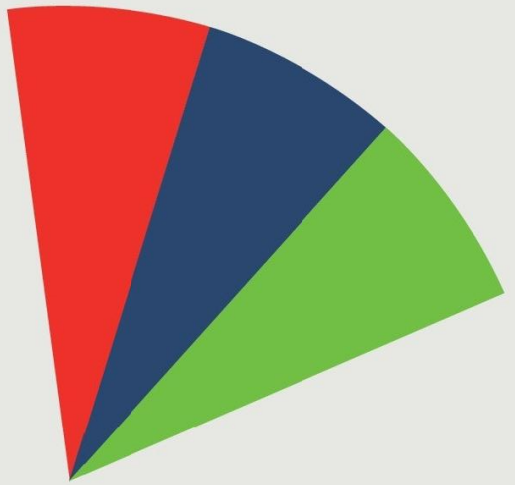


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Talent Development in Mathematics, Science and Technology I, II

G. Kalmbach (Ed.) 1990 Aegis-Verlag Ulm

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