

1. Record Nr.	UNISA996503551503316
Titolo	Dialogues between physics and mathematics : C. N. Yang At 100 // edited by Mo-Lin Ge, Yang-Hui He
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2022] ©2022
ISBN	3-031-17523-9
Descrizione fisica	1 online resource (324 pages)
Disciplina	780
Soggetti	Mathematics Física matemàtica Llibres electrònics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Intro -- Preface -- Acknowledgements -- Contents -- 1 Frank Yang at Stony Brook and the Beginning of Supergravity -- 1.1 Prologue -- 1.2 Frank Before Coming to Stony Brook -- 1.3 Early Years of Frank at Stony Brook -- 1.4 Supersymmetry and Quantum Gravity Before 1976 -- 1.5 Some Recollections of the Path to Supergravity at Stony Brook -- 1.6 Supergravity Lives! -- 1.7 Epilogue -- 1.8 Later Years of Frank at Stony Brook -- References -- 2 A Stacky Approach to Crystals -- 2.1 Introduction -- 2.1.1 A Theorem of Bhatt-Morrow-Scholze -- 2.1.2 A Generalization -- 2.1.3 Isocrystals -- 2.1.3.1 What We Mean by an Isocrystal -- 2.1.3.2 The Result on Isocrystals -- 2.1.3.3 "Banachian Games" and "p-adic Formal Schemes" -- 2.2 Crystals and Crystalline Cohomology -- 2.2.1 A Class of Schemes -- 2.2.2 Some Simplicial Formal Schemes -- 2.2.2.1 The Simplicial Scheme P -- 2.2.2.2 The Simplicial Formal Scheme F -- 2.2.2.3 The Simplicial Formal Scheme A -- 2.2.3 Notation and Terminology Related to Quasi-Coherent Sheaves -- 2.2.3.1 p-adic Formal Schemes and Stacks -- 2.2.3.2 The Notation QCoh(Y) -- 2.2.3.3 Zp-Flatness -- 2.2.3.4 Finite Generation -- 2.2.3.5 Cohomology -- 2.2.3.6 Equivariant Objects -- 2.2.3.7 Objects of QCoh(Y) as Sheaves -- 2.2.3.8 Proof of (2.2) -- 2.2.4 Formulation of the Results -- 2.2.4.1 Convention -- 2.2.5 Proof of Theorem 2.1(i) -- 2.2.5.1 The Simplicial Formal Scheme X -- 2.2.5.2

End of the Proof -- 2.2.6 Proof of Theorem 2.1(ii) -- 2.2.6.1 General Remark -- 2.2.6.2 The Functor in One Direction -- 2.2.6.3 Factorizing the Functor (2.8) -- 2.2.7 Proof of Theorem 2.1(iii) -- 2.2.7.1 General Remark -- 2.2.7.2 The Map in One Direction -- 2.2.7.3 End of the Proof -- 2.2.8 $H^0(X, \mathcal{O}_X)$ and the Ring of Constants -- 2.2.8.1 The Ring of Constants -- 2.3 Isocrystals -- 2.3.1 A Class of Schemes.

2.3.1.1 The Ring of Constants -- 2.3.2 Coherent Crystals and Isocrystals -- 2.3.3 Local Projectivity -- 2.3.4 Proof of Proposition 2.4 -- 2.3.4.1 Strategy -- 2.3.5 Isocrystals as Vector Bundles -- 2.3.5.1 The Category $\text{Vect}(X)$ -- 2.3.5.2 Flat Descent for $\text{Vect}(X)$ -- 2.3.5.3 Equivariant Objects of $\text{Vect}(X)$ -- 2.3.6 Banachian Games -- 2.3.6.1 One of the Goals -- 2.3.6.2 Proof of Theorem 2.2 -- 2.3.7 Proof of Propositions 2.5 and 2.6 -- Appendix -- The Isomorphism Between $W(X)/G$ and the Prismatization of X -- The Goal -- Prismatization of Semiperfect Fp-Schemes -- Perfect Case -- General Case -- The Morphism $W(X)$ -- The eech Nerve of (2.30) -- References -- 3 The Potts Model, the Jones Polynomial and Link Homology -- 3.1 Introduction -- 3.2 Bracket Polynomial and Jones Polynomial -- 3.3 Khovanov Homology and the Cube Category -- 3.4 The Dichromatic Polynomial and the Potts Model -- 3.5 Khovanov Homology -- 3.6 Homology and the Potts Model -- 3.7 The Potts Model and Stosic's Categorification of the Dichromatic Polynomial -- 3.8 Imaginary Temperature, Real Time and Quantum Statistics -- References -- 4 The Penrose-Onsager-Yang Approach to Superconductivity and Superfluidity -- 4.1 Quantum Condensation: The Onsager-Penrose-Yang Approach -- 4.2 Some Considerations and Questions Raised by the Content of Sect.4.1 -- 4.3 What Is Special About Quantum Condensates? -- 4.4 Why Is Nature So Fond of "Simple" Quantum Condensation? Why Is "Fragmentation" So Rare? -- 4.5 When Does Fragmentation Occur? -- 4.6 Alternative Approaches to Quantum Condensation: Some Problems -- 4.6.1 ODLRO -- 4.6.2 Anomalous Averages -- 4.6.3 "Spontaneously Broken $U(1)$ Symmetry" -- References.

5 Quantum Operads -- 5.1 Introduction and Brief Survey -- 5.2 Quantum Structures in Symmetric Monoidal Categories -- 5.2.1 Monoidal (=Tensor) Categories \mathcal{V} (Sm16, Sec. 2.2, 2.3) -- 5.2.2 Symmetric Monoidal Categories -- 5.2.3 Magmas, Comagmas, Bimagmas, Associativity and Commutativity for (co, bi)magmas in Symmetric Monoidal Categories (Sm16, Sec. 2.4) -- 5.2.4 Monoids, Comonoids, Bimonoids, and Hopf Algebras in Symmetric Monoidal Categories (Sm16, Def. 2.7) -- 5.2.5 Quantum Quasigroups (Sm16, Sec. 3.1) -- 5.2.6 Quantum Loops -- 5.2.7 Functoriality (Sm16, Prop. 3.4) -- 5.2.8 Magmas etc. in the Categories of Sets with Direct Product -- 5.3 Monoidal Categories of Operads -- 5.3.1 Graphs and Their Categories -- 5.3.2 Operads and Categories of Operads (See BoMa08, Sec. 1.6, p. 262) -- 5.3.3 Operads and Collections as Symmetric Monoidal Categories -- 5.3.4 Operads as Monoids -- 5.3.4.1 Freely Generated Operads -- 5.3.5 Comonoids in Operadic Setup -- 5.3.6 The Magmatic Operad (See ChCorGi19) -- 5.3.7 Quasigroup Monomials and Planar Trees -- 5.4 Moufang Loops and Operads -- 5.4.1 Moufang Monomials and Their Encoding by Labeled Graphs -- 5.4.2 Passage to Moufang Operad: Basic Identity -- 5.4.3 Moufang Collections (See BoMa08, Sec. 1.5, pp. 259-261) -- 5.4.4 Latin Square Designs and Their Encoding by Graphs -- 5.4.4.1 Simplest Examples -- 5.4.5 From

Loops to Latin Square Designs -- 5.5 Operadic Structures on Quantum States -- 5.5.1 Operads of Classical and Quantum Probabilities -- 5.5.1.1 Averages as an Algebra Over the Operad P -- 5.5.1.2 A-Operad and Entropy -- 5.5.2 Classical Probabilities from Quantum States -- 5.5.3 Non-unital Operads -- 5.5.4 The QP-Operad of Quantum States -- 5.5.5 The Q-Operad of Quantum States -- 5.5.6 Trees of Projective Quantum Measurements -- 5.5.7 Entropy Functionals -- 5.5.8 A-Operad of Quantum Channels.

5.6 Operads and Almost-Symplectic Quantum Codes -- 5.6.1 Rational and Binary Little Square Operads -- 5.6.1.1 Binary Little Square Operad -- 5.6.1.2 Strict Binary Little Squares -- 5.6.2 Binary Little Square Operads and Almost Symplectic Spaces -- 5.6.3 Colored p-ary Little Squares -- 5.6.3.1 Operads and Almost-Symplectic Structures Over F_p -- 5.6.4 Operad Partial-Action on Quantum Codes -- References -- 6 Quantum Computational Complexity with Photons and Linear Optics -- 6.1 Introduction -- 6.2 The Mathematics: Permanent and Hafnian -- 6.2.1 Permanent -- 6.2.2 Hafnian -- 6.3 The Model: Boson Sampling -- 6.4 Single-Photon Boson Sampling Experiments -- 6.5 Quantum Computational Advantage with Jiuzhang -- 6.6 Applications -- References -- 7 Quantized Twistors, G_2^* , and the Split Octonions -- 7.1 A Key Motivation for the Formulation of Twistor Theory -- 7.2 The 2-Spinor Formalism -- 7.3 Projective Twistor Space -- 7.4 Twistor Kinematics -- 7.5 Quantized Twistor Theory and Massless Fields -- 7.6 Split Octonions and G_2^* -- References -- 8 Kronecker Anomalies and Gravitational Striction -- 8.1 Introduction and General Discussion -- 8.2 Kronecker Anomaly in Thermal Harmonic Oscillator -- Appendix -- Kronecker Anomaly in Electromagnetic Theory -- Mathematical Aspects of Kronecker Anomaly -- Two Dimensional Scalar Electrodynamics on a Torus -- Kronecker Anomaly in Spaces with Constant Curvature -- Absence of Kronecker Anomalies in Even Dimensional de Sitter Spaces -- De Sitter Lacuna -- References -- 9 Projecting Local and Global Symmetries to the Planck Scale -- 9.1 Introduction -- 9.2 Quantum Mechanics -- 9.3 Classical Models Underlying Quantum Mechanics -- 9.4 The Standard Model -- References -- 10 Gauge Symmetry in Shape Dynamics -- 10.1 Gauge Structure: Fundamental, Emergent, Productive -- 10.2 Dynamical Equation for Deformable Bodies. 10.2.1 Referenced Angular Momentum -- 10.2.2 Inertia Tensor and Angular Motion -- 10.2.3 Gauge Symmetry and Gauge Field -- 10.2.4 Dynamical Equation -- 10.2.5 Three Dimensional Notation -- 10.2.6 Specializations -- 10.2.7 Angular Momentum and Energy -- 10.3 Extensions -- 10.3.1 Blobs, Media, and Swarms -- 10.3.2 Molecules and Nuclei -- Appendix -- Direct Calculation -- References -- 11 Why Does Quantum Field Theory in Curved Spacetime Make Sense? And What Happens to the Algebra of Observables in the Thermodynamic Limit? -- 11.1 Introduction -- 11.2 Quantum Field Theory in Curved Spacetime -- 11.2.1 The Problem -- 11.2.2 Practicing with a Spin System -- 11.2.3 A System of Harmonic Oscillators -- 11.2.4 Back to Field Theory -- 11.2.5 What Is Quantum Field Theory in an Open Universe? -- 11.2.6 Non-Free Theories -- 11.3 Quantum Statistical Mechanics and the Thermodynamic Limit -- 11.3.1 The Thermofield Double -- 11.3.2 Surprises in the Thermodynamic Limit -- 11.3.3 Examples from Spin Systems -- 11.3.4 Relation to Quantum Field Theory -- 11.3.5 The Hagedorn Temperature -- 11.3.6 Density Matrices and Entropy -- 11.4 The Large N Limit and the Thermofield Double -- References -- 12 Quantum Anomalous Hall Effect -- 13 Magic Superconducting States in Cuprates -- References.
