BF Reader - other

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3D Dynamics of 4D Topological BF Theory With Boundary

Andrea Amoretti, Alberto Blasi, Nicola Maggiore, Nicodemo Magnoli

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On the Relations between Gravity and BF Theories

Laurent Freidel, Simone Speziale

(Submitted on 20 Jan 2012 (v1), last revised 26 May 2012 (this version, v3))

We review, in the light of recent developments, the existing relations between gravity and topological BF theories at the cla ssical level. We include the Plebanski action in both self-dual and non-chiral formulations, their generalizations, and the MacDowell-Mansouri action.

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A pure Dirac's canonical analysis for four-dimensional BF theories

Alberto Escalante, I. Rubalcava-García

Pasted from <http://arxiv.org/abs/1107.4421>

Non-Abelian BF theory for 2+1 dimensional topological states of matter

A. Blasi, A. Braggio, M. Carrega, D. Ferraro, N. Maggiore, N. Magnoli

Pasted from <http://arxiv.org/abs/1106.4641>

Discrete BF theory

Pavel Mnev

(Submitted on 6 Sep 2008 (v1), last revised 9 Sep 2008 (this version, v2))

In this work we discuss the simplicial program for topological field theories for the case of non-abelian BF theory. Discrete BF theory with finite-dimensional space of fields is constructed for a triangulated manifold (or for a manifold equipped with cubical cell decomposition), that is in a sense equivalent to the topological BF theory on manifold. This discrete version allows one to calculate interesting quantities from the BF theory, like the effective action on cohomology, in terms of finite-dimensional integrals instead of functional integrals, as demonstrated in a series of explicit examples. We also discuss the interpretation of disc rete BF action as the generating function for qL_∞ structure (certain "one-loop version" of ordinary L_∞ algebra) on the cell cochains of triangulation, related to the de Rham algebra of the underlying manifold by homotopy transfer procedure. This wor k is a refinement of older text hep-th/0610326.

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On relationships among Chern-Simons theory, BF theory and matrix model

Takaaki Ishii, Goro Ishiki, Kazutoshi Ohta, Shinji Shimasaki, Asato Tsuchiya

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Two-dimensional topological field theories coupled to four-dimensional BF theory

Merced Montesinos, Alejandro Perez

Pasted from <http://arxiv.org/abs/0711.2875>

Seiberg-Witten map for the 4D noncommutative BF theory

L. C. Q. Vilar, O.S. Ventura, R. L. P. G. Amaral, V. E. R. Lemes, L. O. Buffon

(Submitted on 22 Oct 2007 (v1), last revised 24 Jul 2008 (this version, v2))

We describe the Seiberg-Witten map for the 4D noncommutative BF theory (NCBF). We establish the existence of a map taking the abelian NCBF into its commutative version, in agreement with the hypothesis that such maps are available for any noncommutative theory with Schwarz type topological sectors.

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BF systems on graph cobordisms as topological cosmology

Vladimir N. Efremov, Nikolai V. Mitskievich, Alfonso M. Hernández Magdaleno

Pasted from <http://arxiv.org/abs/0706.4329>

Notes on simplicial BF theory

Pavel Mnev (PDMI Ras)

(Submitted on 31 Oct 2006 (v1), last revised 10 May 2007 (this version, v3))

In this work we discuss the construction of "simplicial BF theory", the field theory with finite-dimensional space of fields, associated to a triangulated manifold, that is in a sense equivalent to topological BF theory on the manifold (with infinite-dimensional space of fields). This is done in framework of simplicial program - program of constructing discrete topological field theories. We also discuss the relation of these constructions to homotopy algebra.

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Quantization of strings and branes coupled to BF theory

John C. Baez, Alejandro Perez

Pasted from <http://arxiv.org/abs/gr-qc/0605087>

Noncommutative Two Dimensional BF Model

Alberto Blasi, Nicola Maggiore, Michele Montobbio

Pasted from <http://arxiv.org/abs/hep-th/0512006>

Covariant Lagrangian Formulation of Chern-Simons and BF Theories

A. Borowiec, L. Fatibene, M. Ferraris, M. Francaviglia

Pasted from <http://arxiv.org/abs/hep-th/0511060>

Three-Dimensional Chern-Simons and BF Theories

A. Borowiec (Wroclaw U.), M. Francaviglia (Torino U.)

(Submitted on 26 Jun 2005)

Our aim in this note is to clarify a relationship between covariant Chern-Simons 3-dimensional theory and Schwartz type topological field theory known also as BF theory.

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Covariant canonical formalism for four-dimensional BF theory

Mauricio Mondragon, Merced Montesinos

Pasted from <http://arxiv.org/abs/gr-qc/0402041>

Chern-Simons Term for BF Theory and Gravity as a Generalized Topological Field Theory in Four Dimensions

Han-Ying Guo, Yi Ling, Roh-Suan Tung, Yuan-Zhong Zhang

(Submitted on 6 Apr 2002 (v1), last revised 25 Jul 2002 (this version, v2))

A direct relation between two types of topological field theories, Chern-Simons theory and BF theory, is presented by using ``Generalized Differential Calculus'', which extends an ordinary p-form to an ordered pair of p and (p+1)-form. We first establish the generalized Chern-Weil homomormism for generalized curvature invariant polynomials in general even dimensional manifolds, and then show that BF gauge theory can be obtained from the action which is the generalized second Chern class with gauge group G. Particularly when G is taken as SL(2,C) in four dimensions, general relativity with cosmological constant can be derived by constraining the topological BF theory.

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Chern-Simons Gauge Theory coupled with BF Theory

Noriaki Ikeda

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Cech, Dolbeault and de Rham cohomologies in Chern-Simons and BF theories

T.A.Ivanova, A.D.Popov

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A Deformation of Three Dimensional BF Theory

Noriaki Ikeda

Pasted from <http://arxiv.org/abs/hep-th/0010096>

Perturbative BF-Yang-Mills theory on noncommutative R^4

H.B. Benaoum (Mainz Uni.)

Pasted from <http://arxiv.org/abs/hep-th/9912036>

On symmetries of Chern-Simons and BF topological theories

Tatiana A. Ivanova, Alexander D. Popov

Pasted from <http://arxiv.org/abs/hep-th/9908177>

An Introduction to Spin Foam Models of Quantum Gravity and BF Theory

John C. Baez

(Submitted on 21 May 1999)

In loop quantum gravity we now have a clear picture of the quantum geometry of space, thanks in part to the theory of spin networks. The concept of `spin foam' is intended to serve as a similar picture for the quantum geometry of spacetime. In gene ral, a spin network is a graph with edges labelled by representations and vertices labelled by intertwining operators. Similarly, a spin foam is a 2-dimensional complex with faces labelled by representations and edges labelled by intertwining operators. In a `spin foam model' we describe states as linear combinations of spin networks and compute transition amplitudes as sums over spin foams. This paper aims to provide a self-contained introduction to spin foam models of quantum gravity and a simpler field theory called BF theory.

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Four-Dimensional Yang-Mills Theory as a Deformation of Topological BF Theory

A. S. Cattaneo, P. Cotta-Ramusino, F. Fucito, M.Martellini, M. Rinaldi, A. Tanzini, M. Zeni

(Submitted on 16 May 1997 (v1), last revised 12 May 1998 (this version, v3))

The classical action for pure Yang--Mills gauge theory can be formulated as a deformation of the topological BF theory where, beside the two-form field B, one has to add one extra-field η given by a one-form which transforms as the difference of two connections. The ensuing action functional gives a theory that is both classically and quantistically equivalent to the o riginal Yang--Mills theory. In order to prove such an equivalence, it is shown that the dependency on the field $ \eta$ can be gauged away completely. This gives rise to a field theory that, for this reason, can be considered as semi -topological or topological in some but not all the fields of the theory. The symmetry group involved in this theory is an affine extension of the tangent gauge grou p acting on the tangent bundle of the space of connections. A mathematical analysis of this group action and of the relevant BRST comp lex is discussed in details.

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Feynman rules and beta-function for the BF Yang-Mills Theory

Maurizio Martellini, Mauro Zeni

(Submitted on 4 Feb 1997)

Yang-Mills theory in the first order formalism appears as the deformation of a topological field theory, the pure BF theory. We discuss this formulation at the quantum level, giving the Feynman rules of the BF -YM theory, the structure of the renormalization and checking its uv-behaviour in the computation of the beta-function which agrees with the expected result.

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4-Dimensional BF Theory as a Topological Quantum Field Theory

John C. Baez

(Submitted on 10 Jul 1995)

Starting from a Lie group G whose Lie algebra is equipped with an invariant nondegenerate symmetric bilinear form, we show th at 4-dimensional BF theory with cosmological term gives rise to a TQFT satisfying a generalization of Atiyah's axioms to manifolds equipped with principal G-bundle. The case G = GL(4,R) is especially interesting because every 4 -manifold is then naturally equipped with a principal G-bundle, namely its frame bundle. In this case, the partition function of a compact oriented 4 -manifold is the exponential of its signature, and the resulting TQFT is isomorphic to that constructed by Crane and Yetter using a sta te sum model, or by Broda using a surgery presentation of 4-manifolds.

Renormalization and finiteness of topological BF theories

C. Lucchesi, O. Piguet, S.P. Sorella