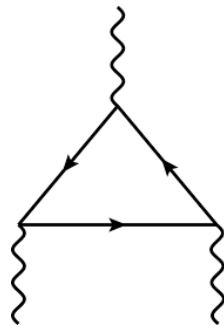
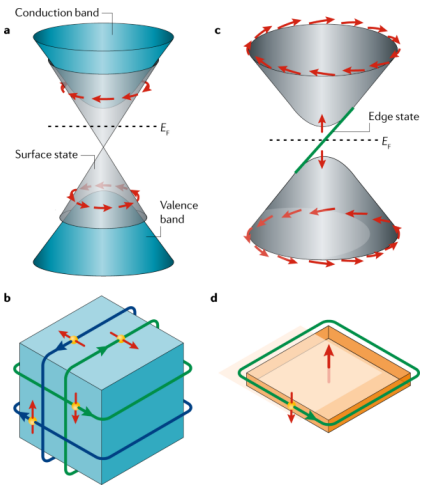
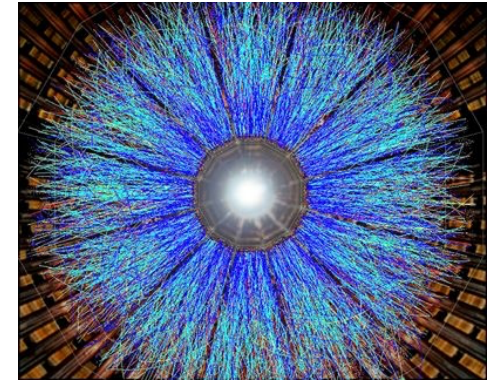
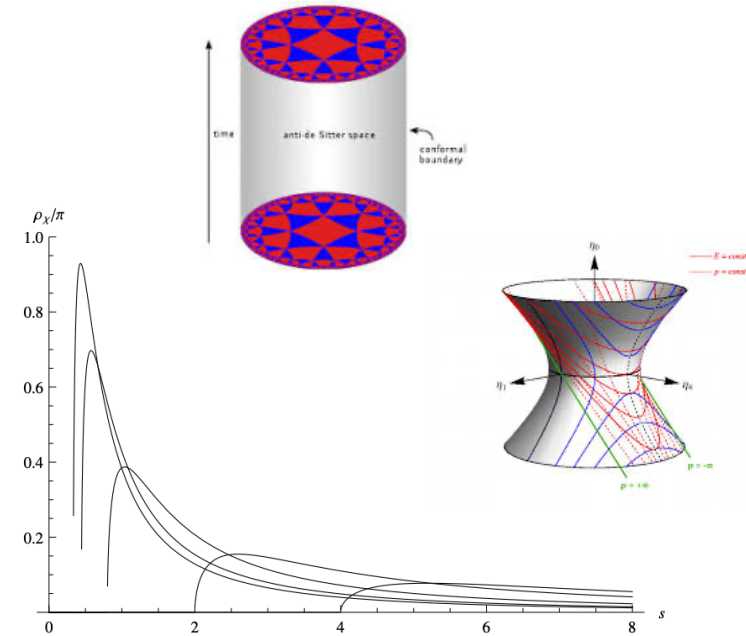


QG sky : Metodologie Teoriche in Fisica delle interazioni Fondamentali e loro Applicazione nella Materia Topologica

Giovanni A. Chirilli



$$\lim_{q \rightarrow 0} \text{diagram} \propto \text{diagram}$$



Short resume

Laurea (vecchio ord.) 2003: Università degli Studi di Lecce (ora Università del Salento)

Master 2005: Old Dominion University, Norfolk VA, USA

PhD 2009: Old Dominion University, Norfolk VA, USA

Thomas Jefferson National Laboratory, Newport News VA, USA

PostDoc 2009-2010: Laboratoire de Physique Théorique, Orsay - France
Ecole Polytechnique, Paris - France

PostDoc 2010-2012: Lawrence Berkeley National Laboratory, Berkeley CA - USA

PostDoc 2012-2015: The Ohio State University, Columbus OH - USA

Senior Scientist 2016-2023: University of Regensburg, Germany
(Teaching for 5 hours per week per semester)

FISICA TEORICA GRUPPO QG-SKY

L'attività del gruppo si colloca nell'ambito dell' Iniziativa Specifica "QG-sky" dell'INFN

<https://web.infn.it/CSN4/index.php/it/17-esperimenti/115-qgsky-home>

Componenti:

Claudio Corianò, Coordinatore

Giovanni A. Chirilli, RTD universitario

dottorandi associati:

Mario Cretì, Stefano Lionetti, Dario Melle, Riccardo Tommasi, Leonardo Torcellini

TEMATICHE GENERALI

Fisica delle Interazioni fondamentali teorica e fenomenologica, con applicazioni alla cosmologia ed alle onde gravitazionali.

L'attività di ricerca si caratterizza nello sviluppo di **metodologie teoriche** di rilevanza **fenomenologica** per esperimenti correnti in ambito internazionale di interesse nell' area **INFN**.

È in corso una collaborazione con **CNR-Nanotec**

Studio di materiali topologici nella **computazione quantistica** ed **elettrodinamica assionica**

LINEE DI RICERCA

1. Teoria dei Campi conforme e sue applicazioni nella cosmologia dell'Universo primitivo

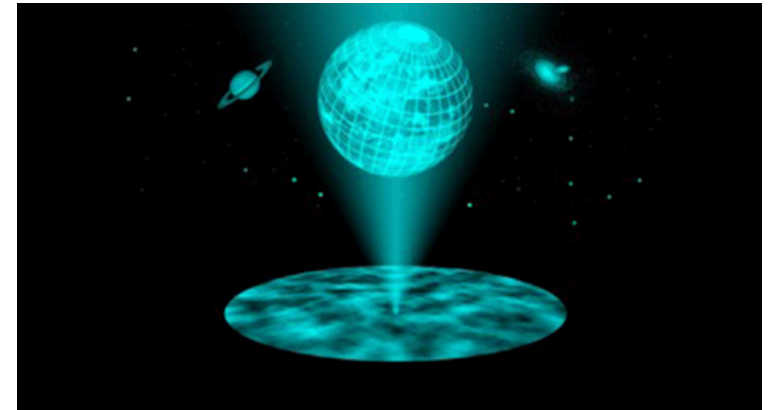
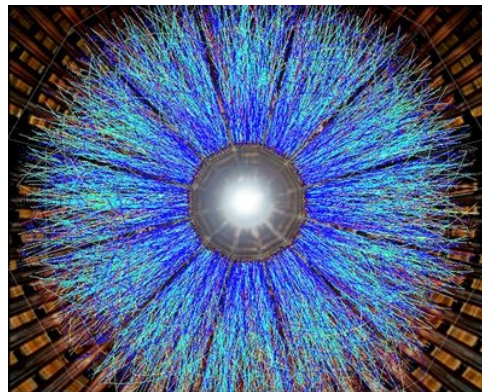
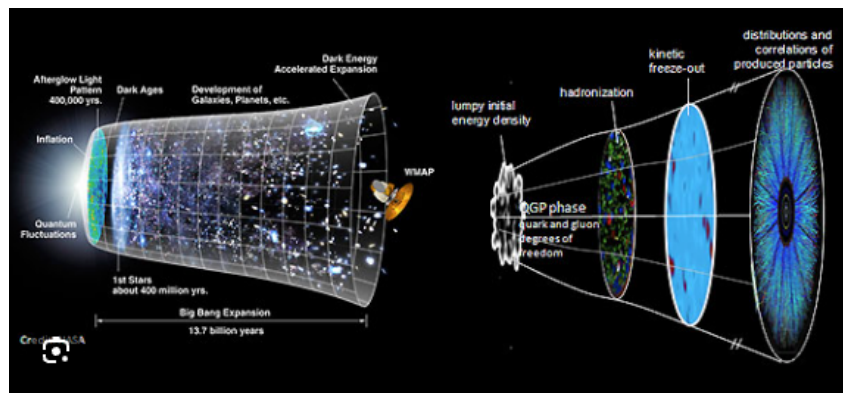
2a. Estensioni della Relatività Generale ed applicazioni alle onde gravitazionali

2b. Olografia cosmologica e corrispondenza De Sitter-CFT

Gravitational shock waves and scattering amplitudes

Understanding the role of Light-Ray/Wilson lines Operators in the AdS/CFT correspondence

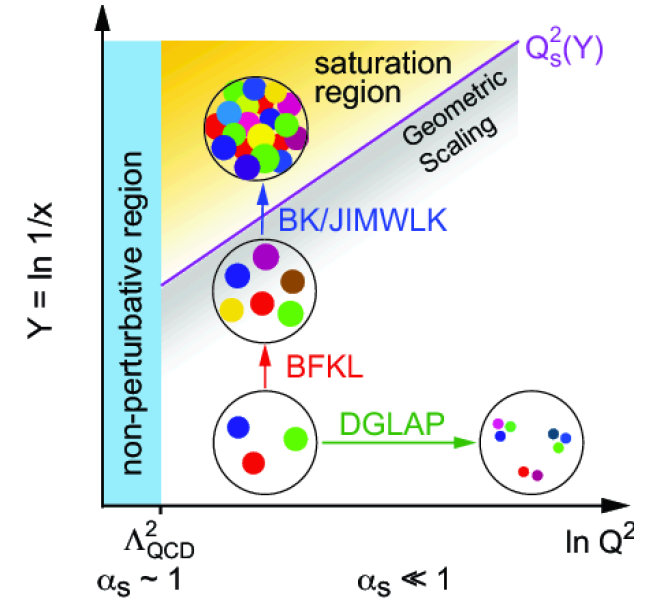
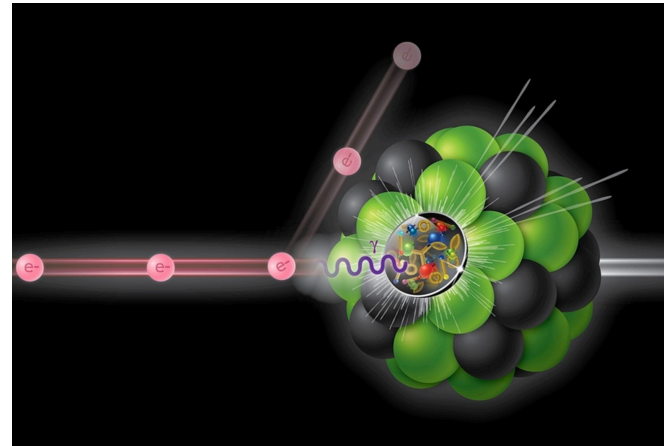
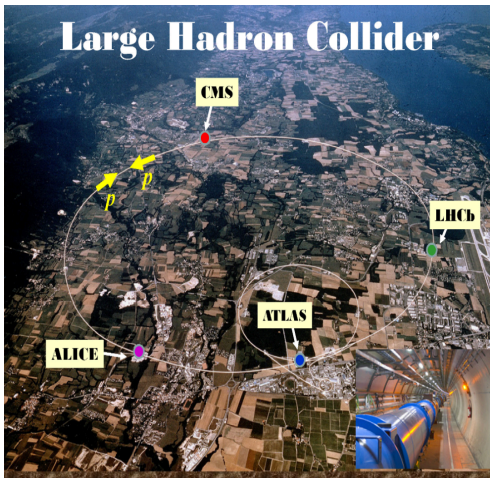
The light-ray operators, which are integral transforms of local operators along a light-like line, provide a unifying framework to understand different aspects of the duality.



3a. Estensioni del Modello Standard delle interazioni fondamentali, per applicazioni all LHC

3b. QCD perturbativa e Teoria dei campi termica

Electron-Ion Collider al Brookhaven NY e Large Hadron electron Collider (LHeC)-FCC Ginevra
Studio di TMDs e teoremi di fattorizzazione; spin del protone; evoluzione delle funzioni partoniche



4. Teoria dei Campi topologica ed applicazioni ai materiali topologici

FINANZIAMENTI: PRIN 2023 "The Holographic Universe " con M. Taronna e C. Sleight (Napoli, Federico II)
COST ACTION (coordinamento Univ. di Padova)

COLLABORAZIONI NAZIONALI (in QG SKY)

Naples: S. Capozziello, G. Covone,
G. Esposito [Local Coordinator],
M.F. De Laurentis, E. Piedipalumbo

Salerno: **G. Lambiase**

Trieste (SISSA);
L. Danese, A. Lapi, P. Salucci [Local
Coordinator], R. Valdarnini.

Genoa research group:
S. Carloni, C. Carmeli, R. Cianci, S. Vignolo,
V. Vitagliano

MEMBERSHIP: National Center for High-Power-Computing, nodo INFN/Unisalento

COLLABORAZIONI Nazionali ed
INTERNAZIONALI

Università di Southampton
K. Skenderis's group, Math. Dept.

Università di TOURS (CNRS) **Maxim
Chernodub's group**

Università di Madrid
Karl Landsteiner

Max Planck (Munich)
Paolo Benincasa

INFN Bari **P. Colangelo, F. De Fazio,
S. Nicotri, F. Giannuzzi**

INFN Frascati **G. Corcella**

Visiting Profs:
Oxford **Paul Frampton**
M. Bochicchio INFN Roma



18–21 Jun 2024
Trani - Italy

EVENTI INTERNAZIONALI ORGANIZZATI

RIUNIONE ANNUALE dell'Iniziativa Specifica
QG SKY Rettorato, Lecce, Ottobre 2024

CNR LECCE: S. D'Agostino
STmicroelectronics A. Bramanti

ESEMPI DI LAVORI RECENTI (2024)

Nonlocal Cosmologies from a Conformal Backreaction and Parity-odd Trace Anomalies

(with S. Lionetti, M.M. Maglio and R. Tommasi)

The $SU(3) \times SU(3) \times U(1)$ (331) Model: Addressing the Fermion Families Problem within Horizontal Anomaly Cancellation

(C. Coriano' Dario Melle)

The Gravitational Chiral Anomaly Vertex at Finite Temperature and Density and some of its Implications

(C. Coriano' M. Creti', S. Lionetti, R. Tommasi)

Axion-like Interactions and CFT in Topological Matter, Anomaly Sum Rules and the Faraday Effect

(C. Coriano' M. Creti', D. Melle. S. Lionetti, R Tommasi) e-Print: [2403.15641](#) [hep-ph]

Axion-like Quasiparticles and Topological States of Matter : Finite Density Corrections of the Chiral Anomaly Vertex

C. Coriano', M. Creti', D. Melle. S. Lionetti, R Tommasi) e-Print: [2402.03151](#) [hep-ph]

2023

Parity-violating CFT and the gravitational chiral anomaly

- *Phys.Rev.D* 109 (2024) 4, 045004 e-Print: [2309.05374](#) [hep-th]

CFT correlators and CP-violating trace anomalies

- *Eur.Phys.J.C* 83 (2023) 9, 839, e-Print: [2307.03038](#) [hep-th]

4D Einstein Gauss-Bonnet Gravity without a Dilaton

- *PoS CORFU2022* (2023) 099, e-Print: [2305.19554](#) [hep-th]

Atmospheric Neutrino Octant from Flavour Symmetry

Mod. Phys. Lett. 2023

Parity-odd 3-point functions from CFT in momentum space and the chiral anomaly

- *Eur.Phys.J.C* 83 (2023) 6, 502 e-Print: [2303.10710](#) [hep-th]

Three-wave and four-wave interactions in the 4d Einstein Gauss-Bonnet (EGB) and Lovelock theories

Nucl.Phys.B 998 (2024) 116420

Broken scale invariance and the regularization of a conformal sector in gravity with Wess-Zumino actions

- *Phys.Lett.B* 843 (2023) 138003

An SU(15) approach to bifermion classification

Mod.Phys.Lett.A 38 (2023)

Four-point functions of gravitons and conserved currents of CFT in momentum space: testing the nonlocal action with the TTJJ

Eur.Phys.J.C 83 (2023) 5, 427

Pseudo and quasi quark PDF in the BFKL approximation

Giovanni Antonio Chirilli (Santiago de Compostela U., IGFAE)

Published in: *JHEP* 07 (2023) 068 • e-Print: [2305.02270](#) [hep-ph]

Rapidity evolution of TMDs with running coupling

Ian Balitsky, Giovanni A. Chirilli

Published in: *Phys.Rev.D* 106 (2022) 3, 034007 • e-Print: 2205.03119 [hep-ph]

High-energy operator product expansion at sub-eikonal level

Giovanni Antonio Chirilli (Regensburg U.)

Published in: *JHEP* 06 (2021) 096 • e-Print: 2101.12744 [hep-ph]

Conformal invariance of TMDs Parton distribution rapidity evolution

Ian Balitsky, Giovanni A. Chirilli (May 22, 2019)

Published in: *Phys.Rev.D* 100 (2019) 5, 051504 • e-Print: 1905.09144 [hep-ph]

Sub-eikonal corrections to scattering amplitudes at high energy

Giovanni Antonio Chirilli (Regensburg U.)

Published in: *JHEP* 01 (2019) 118 • e-Print: 1807.11435 [hep-ph]