

# CURRICULUM VITAE ET STUDIORUM

## Colferai Dimitri

**Date of birth:** February 25, 1972

**Place of birth:** Feltre (Italy)

**Citizenship:** Italian

**Languages:**

Mothertongue: Italian

Very good knowledge of English

Good knowledge of German

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## Education

- 1986-1991: Liceo Scientifico “G. Dal Piaz” of Feltre (Italy).  
June 1991: Diploma di Maturità Scientifica (Bachelor degree) with 56/60 votation.
- 1991-1996: University of Padua (Italy).  
June 1996: Degree in Physics with maximum (110/110 cum laude) votation.  
Title of the thesis:  
**“Causal and instantaneous interaction in Yang-Mills theories in 1 + 1 dimensions: the Wilson loop in light cone gauge.”**  
Supervisor: Prof. Antonio Bassetto.
- 1996-1999: Ph. D. in Physics at the University of Florence (Italy).  
February 2000: Discussion of the Ph. D. thesis:  
**“Perturbative Quantum Chromodynamics at High Energies”**  
Supervisor: Prof. Marcello Ciafaloni.

## Post doc positions

- Post doc grant “A. della Riccia” January – September 2000  
Collaboration with the particle physics theory group of Hamburg University (Germany). Title of the work: *Resummation techniques for small- $x$ -Bjorken processes*.
- Post doc contract COFIN 2000 October 2000 – March 2001  
Collaboration with the particle physics theory group of Hamburg University (Germany). Title of the work: *Perturbative calculation of QCD cross sections at high energies*.
- Post doc fellowship “Alexander von Humboldt” April 2001 – June 2002  
Collaboration with the particle physics theory group of Hamburg University (Germany). Title of the work: *Phenomenology of forward jets and dijets*.
- Post doc fellowship (assegno di ricerca) July 2002 – now  
at the University of Florence (Italy). Title of the work: *Application of high-energy QCD techniques to TeV energy collider physics*.  
Association to the National Institute of Nuclear Physics (INFN).
- Teaching February-March 2004, December 2004  
Lecturer of Physics and Electronics at “Consorzio Ellittica” of Pisa (Italy).

## Job contracts

- Research fellow with a temporary position July 2005 - August 2006  
at the University of Florence (Italy). Title of the contract: *Predictions of Quantum Chromodynamics at small- $x$  for TeV-scale colliders*.  
Association to the National Institute of Nuclear Physics (INFN).
- Researcher September 2006 - November 2017  
at the Physics and Astronomy Department of Florence University (Italy).
- Professor since Dicembre 2017  
at the Physics and Astronomy Department of Florence University (Italy).  
Association to the National Institute of Nuclear Physics (INFN).

## Computing skills

- **Operating systems:** UNIX, LINUX, WINDOWS, MS-DOS.
- **Programming languages:**  
C, C++, Mathematica (expert); Fortran, Matlab (basic knowledge).
- **Graphics and simulation applications:** OrCAD Capture, OrCAD PSpice, ROOT.
- **Editors:** L<sup>A</sup>T<sub>E</sub>X, Word, PowerPoint, HTML.

- **Database:** Access, Excell.
- **Neural networks**

## Organization activities

- Scientific Secretary and Webmaster of the workshop *QCDNET99, International Workshop (Second European QCD-network workshop)*.
- Member of the organizing committee of the theoretical physics meeting *CORTONA 2004 (XXVI edition)*.
- Member of the organizing committee and Webmaster of the symposium *RADCOR 2007 (8th International Symposium on Radiative Corrections)*.
- Member of the organizing committee of the workshop *DIS2010, XVIII International Workshop on Deep-Inelastic Scattering and Related Subjects*.
- Convener of the working group “Diffraction and vector meson” of the workshop *DIS 2012, XX International Workshop on Deep-Inelastic Scattering and Related Subjects*.
- Member of the organizing committee of the conference *High precision for hard processes” HP2.5, Firenze 2014*.
- Member of the local organizing committee of the workshop *Prospects and Precision at the Large Hadron Collider at 14 TeV* at Galileo Galilei Institute for theoretical physics, September-October 2014.

## Attended conferences

- CERN (Swiss) *February 1998*  
Theory of LHC processes.
- Brussels (Belgium) *April 1998*  
VI international workshop on deep inelastic scattering and QCD (DIS 98).
- Durham (UK) *September 1998*  
First QCD-Network meeting, UK phenomenology workshop on HERA physics.
- Zurich (Switzerland) *January 2017*  
Zurich Phenomenology Workshop 2017

## Works presented at conferences

- Cortona (Italy) *May 1998*  
Meeting of Theoretical Physics: *1-loop impact factors and BFKL equation in  $NLLx$  approximation*.

- DESY Zeuten (Germany) June 1998  
Workshop on HERA physics: *1-loop impact factors and  $NLLx$  BFKL equation.*
- Les Arcs (France) March 1999  
XXXIV Rencontres de Moriond: *A solvable model for BFKL dynamics.*
- Cortona (Italy) April 1999  
Meeting of Theoretical Physics: *Hard processed at high energy in QCD.*
- Tel Aviv (Israel) June 1999  
Workshop on low- $x$  physics at HERA: *Renormalization group improved small- $x$  equation.*
- Providence (USA) August 1999  
XXIX International Symposium on Multiparticle Dynamics (ISMD99): *Renormalization group improved small- $x$  equation.*
- Florence (Italy) September 1999  
QCDNET99, International Workshop, Second QCD-Network meeting: *Renormalization group improved small- $x$  equation.*
- Liverpool (UK) April 2000  
VIII international workshop on deep inelastic scattering and QCD (DIS 2000): *Collinear resummation and Renormalization group improved small- $x$  equation.*
- Weimar (Germany) September 2001  
IV European QCD-network meeting (QCDNET 01): *Dijets and Forward Jets in  $NLLx$  Approximation.*
- Montpellier (France) July 2002  
High-Energy Physics International Conference in Quantum Chromodynamics (QCD 02): *Probing QCD at High Energies: Dijets and Forward Jets in  $NL \log s$  Approximation.*
- S.Petersburg (Russia) April 2003  
XI international workshop on deep inelastic scattering (DIS 2003): *Small- $x$  gluon evolution with RG improvement of BFKL-type equation.*
- Cortona (Italy) May 2003  
Meeting of Theoretical Physics: *Extension of the perturbative domain of QCD at high energies.*
- Aachen (Germany) July 2003  
International Europhysics Conference on High Energy Physics (EPS 2003): *Renormalization Group improved Green's function and splitting function.*
- CERN (Swiss) March 2004  
Workshop on the implications of HERA for LHC physics: *The gluon Green function and Splitting function at small- $x$ .*

- Cortona May 2005  
Meeting of Theoretical Physics: *The BFKL equation in dimensional regularization.*
- Tsukuba (Japan) April 2006  
XIV international workshop on deep inelastic scattering (DIS 2006): *Small- $x$  resummation and factorization schemes.*
- Cortona May 2006  
Meeting of Theoretical Physics: *QCD at small  $x$ : factorization scheme dependence.*
- Hamburg (Germany) March 2007  
Workshop on the implications of HERA for LHC physics: *A matrix formulation for small- $x$  singlet evolution.*
- Cortona May 2007  
Meeting of Theoretical Physics: *A matrix formulation for small- $x$  parton densities.*
- Gatchina (Russia) June 2008  
Hadron Structure and QCD workshop (HSQCD 2008) *A matrix formulation for small- $x$  renormalization-group improved evolution.*
- Madrid (Spain) April 2009  
XVII international workshop on deep inelastic scattering (DIS 2009): *A matrix formulation for small- $x$  RG improved evolution.*
- Paris (France) July 2009  
XII Marcel Grossmann Meeting on General Relativity and Gravitation: *S-matrix and quantum tunneling in gravitational collapse.*
- Florence April 2010  
XVII international workshop on deep inelastic scattering (DIS 2010): *Summary talk of the working group “Parton density and small- $x$ ”.*
- Bonn (Germany) April 2012  
XX international workshop on deep inelastic scattering (DIS 2012): *Summary talk of the working group “Vector Mesons and diffraction”.*
- CERN (Swiss) December 2013  
LHCphenoNet meeting: *Mueller-Navelet jets at LHC: matching NLL BFKL with fixed NLO calculations.*
- Madrid (Spain) February 2014  
Scattering Amplitudes & the Multi-Regge Limit 2014: *Improved effective action model & self-consistent metric in planckian scattering.*
- Berlin (Germany) November 2014  
LHCphenoNet final meeting: *Matching NLL BFKL calculations for Mueller-Navelet jets with NLO.*

- Madrid (Spain) April 2015  
LHC Working Group on Forward Physics and Diffraction: *Forward jets at LHC: matching BFKL with NLO.*
- Heraklion (Greece) June 2015  
Workshop on Gravitational Radiation & Black Hole Formation in particle collisions: *SubPlanckian graviton radiation from trans-Planckian particle collisions.*
- Amsterdam (Netherland) May 2016  
QCD Evolution 2016: *Improved theoretical description of Mueller-Navelet jets at LHC.*
- Trento (Italy) September 2016  
QCD at LHC: forward physics and UPC collisions of heavy ions: *Improved theoretical description of Mueller-Navelet jets at LHC.*
- Bari (Italy) June 2017  
Low-x meeting: *Improved theoretical description of Mueller-Navelet jets at LHC.*
- Venice (Italy) July 2017  
EPS Conference on High Energy Physics: *Radiation enhancement and “temperature” in the collapse regime of gravitational scattering.*

## Published articles

- [1] A. Bassetto, D. Colferai and G. Nardelli, **q $\bar{q}$  interaction in light-cone gauge formulations of Yang-Mills theory in 1 + 1 dimensions**, *Nucl. Phys. B* **501** (1997) 227 [hep-th/9706019] and Erratum, *Nucl. Phys. B* **507** (1997) 746;
- [2] M. Ciafaloni and D. Colferai, **k-factorization and impact factors at next-to-leading level**, *Nucl. Phys. B* **538** (1999) 187 [hep-ph/9806350];
- [3] M. Ciafaloni and D. Colferai, **The BFKL equation at next-to-leading level and beyond**, *Phys. Lett. B* **52** (1999) 372 [hep-ph/9812366];
- [4] M. Ciafaloni, D. Colferai and G.P. Salam, **Renormalization Group Improved Small-x Equation**, *Phys. Rev. D* **60** (1999) 114036-1, [hep-ph/9905566];
- [5] M. Ciafaloni, D. Colferai and G.P. Salam, **A collinear model for small-x physics**, *JHEP* **9910** (1999) 017, [hep-ph/9907409];
- [6] M. Ciafaloni, D. Colferai and G.P. Salam, **On factorisation at small-x**, *JHEP* **0007** (2000) 054 [hep-ph/0007240];
- [7] M. Ciafaloni, D. Colferai, G.P. Salam and A.M. Stasto, **Tunneling transition to the Pomeron regime**, *Phys. Lett. B* **541** (2002) 314 [hep-ph/0204287];
- [8] M. Ciafaloni, D. Colferai, G.P. Salam and A.M. Stasto, **Expanding running coupling effects in the hard Pomeron**, *Phys. Rev. D* **66** (2002) 054014 [hep-ph/0204282];

- [9] J. Bartels, M.A. Braun, D. Colferai and G.P. Vacca, **Diffractive  $\eta_c$  photo- and electroproduction with the perturbative QCD Odderon**, *Eur. Phys. J. C* **20** (2001) 323 [hep-ph/0102221];
- [10] J. Bartels, D. Colferai, S. Gieseke and A. Kyrrieleis, **NLO Corrections to the Photon Impact Factor: Combining Real and Virtual Corrections**, *Phys. Rev. D* **66** (2002) 094017 [hep-ph/0208130];
- [11] J. Bartels, D. Colferai and G.P. Vacca, **The NLO Jet Vertex for Mueller-Navelet and Forward Jets: the Quark Part**, *Eur. Phys. J. C* **24** (2002) 83 [hep-ph/0112283];
- [12] J. Bartels, D. Colferai and G.P. Vacca, **The NLO Jet Vertex for Mueller-Navelet and Forward Jets: the Gluon Part** *Eur. Phys. J. C* **29** (2003) 235, [hep-ph/0206290].
- [13] M. Ciafaloni, D. Colferai, G.P. Salam and A.M. Stasto, **Extending QCD perturbation theory to higher energies**, *Phys. Lett. B* **576** (2003) 143, [hep-ph/0305254].
- [14] M. Ciafaloni, D. Colferai, G.P. Salam and A.M. Stasto, **Renormalisation group improved small- $x$  Green's function**, *Phys. Rev. D* **68** (2003) 114003, [hep-ph/0307188].
- [15] M. Ciafaloni, D. Colferai, G.P. Salam and A.M. Stasto, **The gluon splitting function at moderately small- $x$** , *Phys. Lett. B* **587** (2004) 87, [hep-ph/0311325].
- [16] M. Ciafaloni and D. Colferai, **Dimensional regularisation and factorisation schemes in the BFKL equation at subleading level**, *JHEP* **09** (2005) 079, [hep-ph/0507106].
- [17] M. Ciafaloni, D. Colferai, G.P. Salam and A.M. Stasto, **Minimal subtraction vs. physical factorisation schemes in small- $x$  QCD**, *Phys. Lett. B* **635** (2006) 320, [hep-ph/0601200].
- [18] M. Ciafaloni, D. Colferai, G. P. Salam and A. M. Stasto, **A matrix formulation for small- $x$  singlet evolution**, *JHEP* **0708** (2007) 046, [hep-ph/07071453].
- [19] M. Ciafaloni and D. Colferai, **S-matrix and quantum tunneling in gravitational collapse**, *JHEP* **0811** (2008) 047, [hep-th/0807.2117].
- [20] D. Colferai, **A solvable model for small- $x$  physics in  $D > 4$  dimensions**, *JHEP* **0804** (2008) 103, [hep-ph/0712.3124].
- [21] M. Ciafaloni and D. Colferai, **Quantum Tunneling and Unitarity Features of an S-matrix for Gravitational Collapse**, *JHEP* **12** (2009) 062, [hep-th/0909.4523].

- [22] D. Colferai, F. Schwennsen, L. Szymanowski and S. Wallon, **Mueller Navelet jets at LHC - complete NLL BFKL calculation**, *JHEP* **1012** (2010) 026 [arXiv:1002.1365 [hep-ph]].
- [23] M. Ciafaloni, D. Colferai and G. Falcioni, **Unitarity alternatives in the reduced-action model for gravitational collapse**, *JHEP* **1109** (2011) 044 [arXiv:1106.5628 [hep-th]].
- [24] M. Ciafaloni and D. Colferai, **Rescattering corrections and self-consistent metric in Planckian scattering**, *JHEP* **1410** (2014) 85 [arXiv:1406.6540 [hep-th]].
- [25] D. Colferai and A. Niccoli, **The NLO jet vertex in the small-cone approximation for kt and cone algorithms**, *JHEP* **1504** (2015) 071 [arXiv:1501.07442 [hep-ph]].
- [26] M. Ciafaloni, D. Colferai and G. Veneziano, **Emerging Hawking-Like Radiation from Gravitational Bremsstrahlung Beyond the Planck Scale**, *Phys. Rev. Lett.* **115** (2015) 17,171301 [arXiv:1505.06619 [hep-th]].
- [27] M. Ciafaloni, D. Colferai, F. Coradeschi and G. Veneziano, **Unified limiting form of graviton radiation at extreme energies**, *Phys. Rev. D* **93** (2016) 044052, [arXiv:1512.00281 [hep-th]].
- [28] M. Ciafaloni and D. Colferai, **Radiation enhancement and temperature in the collapse regime of gravitational scattering**, *Phys. Rev. D* **95** (2017) 086003, [arXiv:1612.06923 [hep-th]].
- [29] M. Ciafaloni and D. Colferai, **Unitarity restoring graviton radiation in the collapse regime of gravitational scattering**, *Phys. Rev. D* **96** (2017) 126008, [arXiv:1709.08405 [hep-th]].
- [30] M. Ciafaloni, D. Colferai and G. Veneziano, **Infrared features of gravitational scattering and radiation in the eikonal approach**, *Phys. Rev. D* **99** (2019) 066008, [arXiv:1812.08137 [hep-th]].
- [31] S. Catani, D. Colferai and A. Torriani, **Triple (and quadruple) soft-gluon radiation in QCD hard scattering**, *JHEP* **01** (2020) 018, [arXiv:1908.01616 [hep-ph]].
- [32] D. Colferai and S. Lionetti, **Asymptotic symmetries and the subleading soft graviton theorem in higher dimensions**, *Phys. Rev. D* **104** (2021) 064010, [arXiv:2005.03439 [hep-th]].

## Conference Proceedings

- D. Colferai, **A solvable model for BFKL dynamics**, Proceedings of the XXXIV Rencontres de Moriond (March 1999), edited by J. Tran Than Van, published by The Gioi.



- D. Colferai, **Renormalization-group improved BFKL equation**, Proceedings of the XXIX International Symposium on Multiparticle Dynamics (August 1999), edited by Ina Sarcevic and Chung-I Tan, published by World Scientific.
- D. Colferai, **Improved small- $x$  equation and collinear model**, Proceedings of the VIII international Workshop on Deep Inelastic Scattering (April 2000), edited by J. A. Gracey and T. Greenshaw, published by World Scientific.
- D. Colferai, **Probing QCD at high energies: dijets and forward jets in NL log  $s$  approximation**, Proceedings of the High-Energy Physics International Conference in Quantum Chromodynamics (July 02), edited by S. Narison, published in *Nucl. Phys. B (Proc. Suppl.)* **121** (2003) 33.
- D. Colferai, **Gluon evolution at small- $x$ : extending the perturbative domain of QCD** Proceedings of the XI international workshop on deep inelastic scattering (April 2003), edited by V. T. Kim and L. N. Lipatov, published by the Petersburg Nuclear Physics Institute of the Russian Academy of Science.
- D. Colferai, **Small- $x$  resummation and factorisation schemes**, Proceedings of the 14th International Workshop on Deep Inelastic Scattering (DIS 2006), Tsukuba, Japan, 20-24 Apr 2006, edited by M. Kuze, K. Nagano and K. Tokushuku, published by World Scientific.
- S. Alekhin *et al.*, **HERA and the LHC – A workshop on the implications of HERA for LHC physics: Proceedings**, [hep-ph/0601012, hep-ph/0601013].
- D. Colferai, **A matrix formulation for small- $x$  renormalization-group improved evolution**, Proceedings of the Hadron Structure and QCD workshop (HSQCD 2008), Gatchina, Russia, 30 June - 4 July 2008.
- M. Dittmar *et al.*, **Parton Distributions: summary report for the HERA - LHC workshop proceedings**, IFUM-936-FT, [hep-ph/0901.2504].
- D. Colferai, **S-Matrix and Quantum Tunneling in Gravitational Collapse**, proceedings of the Twelfth Marcel Grossmann Meeting on General Relativity. Parigi (Francia), 13-18 Luglio 2009, p. 1178-1180, World Scientific.
- S. Alekhin, D. Colferai, J. Huston, R. Placakyte, **Parton densities from DIS and hadron colliders to LHC: WG summary**, published in PoS DIS2010 (2010) 013.
- D. Colferai, R. Polifka and M. Ruspa, **Summary of the diffraction and vector mesons working group**, DESY-PROC-1012-02/360, p. 113.
- D. Colferai, **Improved theoretical description of Mueller-Navelet jets at LHC**, DESY-PROC-1012-02/360, p. 113. published in PoS QCDEV2016 (2016) 031.

- D. Colferai, **Emerging Hawking-like Radiation In Gravitational Scattering Beyond The Planck Scale**, proceedings of the XV Marcel Grossmann Meeting on General Relativity. Rome (Italy), 1-7 Luglio 2018, World Scientific.
- D. Colferai, **Radiation enhancement and “temperature” in the collapse regime of gravitational scattering**, proceedings of the EPS Conference on High Energy Physics 2017, Venezia (Italia).
- D. Colferai, **Emerging Hawking-like radiation in gravitational scattering beyond the Planck scale**, proceedings of the XV Marcel Grossmann meeting, 2018, Roma.