CURRICULUM - Prof. Massimo BIANCHI

Dati anagrafici:
-Nato a Roma il 3 gennaio 1963
-Cittadinanza italiana
-Sposato con Dott.ssa Alessandra Morelli, due figlie Francesca e Benedetta
-Residente in Via Luigi Pulci 39, Roma 00162

Istruzione:
-Diploma di Maturità (Liceo Scientifico) con votazione 60/60, Luglio 1981, presso Istituto San Giovanni Evangelista, Roma
-Laurea in Fisica, 31 Ottobre 1985, votazione 110/110 e lode, tesi: *"Gravità Quantistica: Formalismo Canonico per un Modello Cosmologico Quantistico"*, relatori: Proff R. Ruffini e F. Guerra, Università di Roma "La Sapienza"
-Dottorato di Ricerca, 22 Settembre 1992, dissertazione finale: *"Rottura della Simmetria nelle Compattificazioni delle Teorie di Stringhe Aperte"*, relatore: Prof A. Sagnotti, Università di Roma "La Sapienza"
-Perfetta conoscenza della lingua Inglese, buona conoscenza delle lingue Francese, Spagnola e Portoghese, basilare della lingua Swahili.

Carriera Accademica:
-Ricercatore presso l'Ente per le Nuove Tecnologie l'Energia e l'Ambiente (ENEA) nel periodo luglio 1990 - ottobre 1991
-Ricercatore presso l'Università degli studi di Roma "Tor Vergata" gruppo di discipline B02A Fisica Teorica (ex n.86) dal 1 novembre 1991; confermato nel ruolo di ricercatore universitario con Decreto Rettorale del 16 ottobre 1995
-Professore Associato presso l'Università degli studi di Roma "Tor Vergata" gruppo di discipline B02A Fisica Teorica (ex n.86) dal 1 novembre 1998; confermato nel ruolo di Professore Associato con Decreto Rettorale del 2002
-Professore Visitore presso "Department of Applied Mathematics and Theoretical Physics" dell'Università di Cambridge UK, A.A. 2000-01
-Professore Visitore presso il CERN di Ginevra CH, A.A. 2007-08
-Professore Visitatore presso Imperial College di Londra UK, A.A. 2012-13
-Leverhulme Visiting Professor presso Queen Mary University of London UK, A.A. 2012-13
-Professore Visitatore presso Ecole Normale Superieure di Parigi FR, A.A. 2012-13
-Professore Visitatore presso Ecole Polytechnique di Palaiseau, Parigi FR, A.A. 2012-13
-Abilitazione Scientifica Nazionale per il settore 02/A2 e per la Prima fascia con validità dall'8 gennaio 2014 all'8 gennaio 2020, vedasi https://abilitazione.cineca.it/ministero.php/public/esitoAbilitati/settore/02%252FA2/fascia/1

Borse di studio e Premi:

-Vincitore della borsa di studio "Enrico Persico" dell' Accademia Nazionale dei Lincei per i migliori studenti del corso di laurea in Fisica dell'Università di Roma dell'anno accademico 1984-85
Borsista dell'Istituto Nazionale Fisica Nucleare (INFN) nel periodo ottobre 1986 - settembre 1988
-Borsa di Dottorato di Ricerca (IV ciclo) nel periodo novembre 1988 - ottobre 1991, presso l'Università degli studi di Roma "Tor Vergata" (sede consorziata)
-Vincitore con Augusto Sagnotti del premio della Società Italiana di Relatività Generale e Fisica della Gravitazione (SIGRAV) nel 1994 (settore A) per il lavoro: M. Bianchi e A. Sagnotti: *"On the Systematics of Open-String Theories"*

Attività di Ricerca (risultati principali e relative pubblicazioni):
-Costruzione sistematica di teorie con stringhe aperte e non orientate:
"Open Strings And The Relative Modular Group"
Massimo Bianchi, Augusto Sagnotti, Phys.Lett.B231:389,1989.
TOPCITE = 50+ Citazioni 60 [08-02-2017]
"The Partition Function of the SO(8192) Bosonic String"
Massimo Bianchi, Augusto Sagnotti, Phys.Lett.B211:407,1988.
TOPCITE = 50+ Citazioni 65 [08-02-2017]
"On the systematics of open string theories",
Massimo Bianchi, Augusto Sagnotti,
Phys.Lett.B247:517-524,1990
TOPCITE = 250+ Citazioni 480 [08-02-17]
"Twist symmetry and open string Wilson lines",
Massimo Bianchi, Augusto Sagnotti, Nucl.Phys.B361:519-538,1991
TOPCITE = 250+ Citazioni 362 [08-02-2017]
"Toroidal compactification and symmetry breaking in open string theories",
M. Bianchi, G. Pradisi, A. Sagnotti, Nucl.Phys.B376:365-386,1992
TOPCITE = 250+ Citazioni 326 [08-02-2017]
"A Note on toroidal compactifications of the type I superstring and other superstring vacuum configurations with sixteen supercharges"
Massimo Bianchi, Nucl.Phys.B528:73-94,1998. e-Print: hep-th/9711201
TOPCITE = 100+ Citazioni 105 [08-02-2017]
"The Open story of the magnetic fluxes"
Massimo Bianchi, Elisa Trevigne.
hep-th/0502147. 10.1088/1126-6708/2005/08/034.
JHEP 0508 (2005) 034
TOPCITE = 50+ Citazioni 51 [08-02-2017]
-Modelli di Superstringa di Tipo I chirali e U(1) anomali:
"Comments on Gepner models and type I vacua in string theory"

Carlo Angelantonj, Massimo Bianchi, Gianfranco Pradisi, Augusto Sagnotti, Yassen S. Stanev, Phys.Lett.B387:743-749,1996. e-Print: hep-th/9607229
TOPCITE = 100+ Citazioni 134 [08-02-2017]
"Chiral asymmetry in four-dimensional open string vacua",
C. Angelantonj, M. Bianchi, G. Pradisi, A. Sagnotti, Ya.S. Stanev, Phys.Lett.B385:96-102,1996. e-Print: hep-th/9606169
TOPCITE = 100+ Citazioni 250 [08-02-2017]
"Anomalies & tadpoles"
Massimo Bianchi, Jose F. Morales, JHEP 0003:030,2000. e-Print: hep-th/0002149
TOPCITE = 50+ Citazioni 71 [08-02-2017]
"Anomalies, anomalous U(1)'s and generalized Chern-Simons terms"
Pascal Anastasopoulos, M. Bianchi, E. Dudas, E. Kiritsis, JHEP 0611:057,2006. e-Print: hep-th/0605225
TOPCITE = 50+ Citazioni 133 [08-02-2017]
-Effetti istantonici in teorie di gauge supersimmetriche e di superstringa:
"Instantons in supersymmetric Yang-Mills and D instantons in IIB superstring theory" Massimo Bianchi, Michael B. Green, Stefano Kovacs, Giancarlo Rossi, JHEP 9808:013,1998. e-Print: hep-th/9807033
TOPCITE = 100+ Citazioni 175 [08-02-2017]
*"D-brane instantons on the T**6 / Z(3) orientifold"*
Massimo Bianchi, Francesco Fucito, Jose F. Morales, JHEP 0707:038,2007. e-Print: arXiv:0704.0784 [hep-th]
TOPCITE = 100+ Citazioni 105 [08-02-2017]
"Non-perturbative and Flux superpotentials for Type I strings on the Z(3) orbifold"
Massimo Bianchi, Elias Kiritsis, Nucl.Phys.B782:26-50,2007. e-Print: hep-th/0702015
TOPCITE = 50+ Citazioni 89 [08-02-2017]
"Instanton corrections to circular Wilson loops in N=4 supersymmetric Yang-Mills"
Massimo Bianchi, Michael B. Green, Stefano Kovacs.
hep-th/0202003. 10.1088/1126-6708/2002/04/040.
JHEP 0204 (2002) 040
TOPCITE = 50+ Citazioni 55 [08-02-2017]
"Instanton corrections to the effective action of N=4 SYM"
Massimo Bianchi, Jose Francisco Morales, Congkao Wen.
arXiv:1508.00554 [hep-th].
10.1007/JHEP11(2015)006.
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"Magnetized E3-brane instantons in F-theory"
By Massimo Bianchi, Andres Collinucci, Luca Martucci.
arXiv:1107.3732 [hep-th]. 10.1007/JHEP12(2011)045.

JHEP 1112 (2011) 045.
Citazioni 49 [08-02-2017]

-Rinormalizzazione olografica, spin elevati, corrispondenza AdS/CFT:

"Holographic renormalization"
Massimo Bianchi, Daniel Z. Freedman, Kostas Skenderis, Nucl.Phys.B631:159-194,2002; e-Print: hep-th/0112119
TOPCITE = 100+ Citazioni 390 [08-02-2017]

"How to go with an RG flow"
Massimo Bianchi, Daniel Z. Freedman, Kostas Skenderis, JHEP 0108:041,2001; e-Print: hep-th/0105276
TOPCITE = 100+ Citazioni 250 [08-02-2017]

"Anatomy of two holographic renormalization group flows".
Massimo Bianchi, Oliver De Wolfe, Daniel Z. Freedman, Krzysztof Pilch, JHEP 0101:021,2001. e-Print: hep-th/0009156
TOPCITE = 50+ Citazioni 59 [08-02-2017]

"Higher spin symmetry and N=4 SYM"
Niklas Beisert, Massimo Bianchi, Jose F. Morales, Henning Samtleben, JHEP 0407:058,2004. e-Print: hep-th/0405057
TOPCITE = 50+ Citazioni 95 [08-02-2017]

"On the spectrum of AdS / CFT beyond supergravity"
N. Beisert, J.F. Morales, H. Samtleben, JHEP 0402:001,2004, e-Print: hep-th/0310292
TOPCITE = 50+ Citazioni 86 [08-02-2017]

*"On stringy AdS(5) x S**5 and higher spin holography"*
Massimo Bianchi, Jose F. Morales, Henning Samtleben, JHEP 0307:062,2003. e-Print: hep-th/0305052
TOPCITE = 100+ Citazioni 141 [08-02-17]

"More on La Grande Bouffe"
Massimo Bianchi, Paul J. Heslop, Fabio Riccioni.
hep-th/0504156. 10.1088/1126-6708/2005/08/088.
JHEP 0508 (2005) 088
TOPCITE = 50+ Citazioni 50 [08-02-17]

-Miscelamento di operatori e dimensioni anomale nelle teorie N=4 SYM:

"On operator mixing in N=4 SYM"
Massimo Bianchi, Burkhard Eden, Giancarlo Rossi, Yassen S. Stanev, Nucl.Phys.B646:69-101,2002. e-Print: hep-th/0205321
TOPCITE = 50+ Citazioni 73 [08-02-17]

"Properties of the Konishi multiplet in N=4 SYM theory"
Massimo Bianchi, Stefano Kovacs, Giancarlo Rossi, Yassen S. Stanev, JHEP 0105:042,2001. e-Print: hep-th/0104016
TOPCITE = 100+ Citazioni 100 [08-02-17]

*"Anomalous dimensions in N=4 SYM theory at order g**4"*
Massimo Bianchi, Stefano Kovacs, Giancarlo Rossi, Yassen S. Stanev,

Nucl.Phys.B584:216-232,2000. e-Print: hep-th/0003203
TOPCITE = 100+ Citazioni 119 [08-02-17]
"Nonrenormalization of extremal correlators in N=4 SYM theory"
Massimo Bianchi, Stefano Kovacs, Phys.Lett.B468:102-110,1999.
e-Print: hep-th/9910016
TOPCITE = 50+ Citazioni 58 [08-02-2017]
"On the logarithmic behavior in N=4 SYM theory"
Massimo Bianchi, Stefano Kovacs, Giancarlo Rossi, Yassen S. Stanev, JHEP 9908:020,1999. e-Print: hep-th/9906188
TOPCITE = 100+ Citazioni 105 [08-02-2017]
- Ampiezze di diffusione e loro proprietà:
"Generating Tree Amplitudes in N=4 SYM and N = 8 SG"
Massimo Bianchi, Henriette Elvang, Daniel Z. Freedman.
arXiv:0805.0757 [hep-th]. 10.1088/1126-6708/2008/09/063.
JHEP 0809 (2008) 063
TOPCITE = 100+ Citazioni 140 [08-02-17]
"More on Soft Theorems: Trees, Loops and Strings"
Massimo Bianchi, Song He, Yu-tin Huang, Congkao Wen.
arXiv:1406.5155 [hep-th].
10.1103/PhysRevD.92.065022.
Phys.Rev. D92 (2015) no.6, 065022
TOPCITE = 50+ Citazioni 55 [08-02-2017]
"On the soft limit of open string disk amplitudes with massive states"
Massimo Bianchi, Andrea L. Guerrieri.
arXiv:1505.05854 [hep-th].
10.1007/JHEP09(2015)164.
JHEP 1509 (2015) 164
CITAZIONI 18 [02-08-2017]
"Exploring soft constraints on effective actions"
Massimo Bianchi, Andrea L. Guerrieri, Yu-tin Huang, Chao-Jung Lee, Congkao Wen.
arXiv:1605.08697 [hep-th].
10.1007/JHEP10(2016)036.
JHEP 1610 (2016) 036.
"On the soft limit of closed string amplitudes with massive states"
Massimo Bianchi, Andrea L. Guerrieri.
arXiv:1512.00803 [hep-th].
10.1016/j.nuclphysb.2016.02.005.
Nucl.Phys. B905 (2016) 188-216.
"Simplifying one-loop amplitudes in superstring theory"
Massimo Bianchi, Dario Consoli.
arXiv:1508.00421 [hep-th].
10.1007/JHEP01(2016)043.

JHEP 1601 (2016) 043.

-Buchi neri in Teorie di Stringhe:

"More on microstate geometries of 4d black holes"
Massimo Bianchi, Jose Francisco Morales, Lorenzo Pieri, Natale Zinnato.
arXiv:1701.05520 [hep-th].

"Glimpses of black hole formation/evaporation in highly inelastic, ultra-planckian string collisions"
Andrea Addazi, Massimo Bianchi, Gabriele Veneziano.
arXiv:1611.03643 [hep-th], in corso di pubblicazione su JHEP

"Stringy origin of 4d black hole microstates"
Massimo Bianchi, Josè Francisco Morales, Lorenzo Pieri.
arXiv:1603.05169 [hep-th], 10.1007/JHEP06(2016)003.
JHEP 1606 (2016) 003.

"Perturbative and Non-perturbative N =8 Supergravity"
Massimo Bianchi, Sergio Ferrara, Renata Kallosh.
arXiv:0910.3674 [hep-th].
10.1016/j.physletb.2010.05.049.
Phys.Lett. B690 (2010) 328-331
CITAZIONI 29 [02-08-2017]

-Violazione dei numeri leptonici e barionico:

"Exotic see-saw mechanism for neutrinos and leptogenesis in a Pati-Salam model"
Andrea Addazi, Massimo Bianchi, Giulia Ricciardi.
arXiv:1510.00243 [hep-ph] 10.1007/JHEP02(2016)035.
JHEP 1602 (2016) 035.
CITAZIONI 21 [02-08-2017]

"Neutron Majorana mass from Exotic Instantons in a Pati-Salam model"
Andrea Addazi, Massimo Bianchi.
arXiv:1502.08041 [hep-ph]. 10.1007/JHEP06(2015)012.
JHEP 1506 (2015) 012
CITAZIONI 24 [02-08-2017]

"Un-oriented Quiver Theories for Majorana Neutrons"
Andrea Addazi, Massimo Bianchi.
arXiv:1502.01531 [hep-ph]. 10.1007/JHEP07(2015)144.
JHEP 1507 (2015) 144.
CITAZIONI 24 [02-08-2017]

"Neutron Majorana mass from exotic instantons"
Andrea Addazi, Massimo Bianchi.
arXiv:1407.2897 [hep-ph].
10.1007/JHEP12(2014)089.
JHEP 1412 (2014) 089
CITAZIONI 28 [02-08-2017]

-Fenomenologia di stati leggeri di stringa:

"Yukawa's of light stringy states"
Pascal Anastasopoulos, Massimo Bianchi, Dario Consoli.
arXiv:1609.09299 [hep-th].
"Revisiting light stringy states in view of the 750 GeV diphoton excess"
Pascal Anastasopoulos, Massimo Bianchi.
arXiv:1601.07584 [hep-th] 10.1016/j.nuclphysb.2016.08.033.
Nucl.Phys. B911 (2016) 928-954.
"Light stringy states"
Pascal Anastasopoulos, Massimo Bianchi, Robert Richter.
arXiv:1110.5424 [hep-th].
10.1007/JHEP03(2012)068.
JHEP 1203 (2012) 068.
CITAZIONI 14 [02-08-2017]
"On stable higher spin states in Heterotic String Theories"
Massimo Bianchi, Luca Lopez, Robert Richter.
arXiv:1010.1177 [hep-th]. 10.1007/JHEP03(2011)051.
JHEP 1103 (2011) 051
CITAZIONI 19 [02-08-2017]

Incarichi, affiliazioni e altri titoli:
-Associato con incarichi di ricerca alla Sezione INFN di Roma "Tor Vergata"
-Membro della Società Italiana di Relatività Generale e Fisica della Gravitazione
-Membro a vita (Life Member) del College Clare Hall dell'Università di Cambridge UK
-Membro del Collegio dei Docenti della Scuola di Dottorato in Fisica, Università di Roma "Tor Vergata", A.A. 2002-03, 2003-04, 2004-05, 2005-06, 2006-07 e dal 2015 in poi.
-Responsabile Nazionale INFN del progetto ESF HOLOGRAV "Holographic Methods of Strongly Coupled Systems"
-Membro delle iniziative specifiche PD-10 e TS-11 dell'INFN su "Teorie di Campo Conformi, Gravità Quantistica e Teorie di Stringa"
-Membro della collaborazione europea CEE SCI-0394-C (EDB) "String Theory and Two-dimensional Conformal Field Theory"
-Membro dei Progetti MIUR-COFIN 2001-1025492, 2003-023852, 2007-5ATT78,
- Responsabile dell'unità di ricerca locale dei progetti MIUR-PRIN 2009-KHZKRX *"Symmetries of the Universe and of its Interactions"* e 2015 MP2CX4002 *"Non-perturbative aspects of gauge theories and strings"*,
-Membro della Commissione di Ateneo per l'attuazione della Legge 104 (Servizio Disabilità) dal 1999 al 2000 e dal 2001 al 2007
-Responsabile del Progetto di Ricerca Scientifica di Ateneo "Fisica delle Interazioni Fondamentali e dei Sistemi Complessi" A.A. 2004-05, 2005-06,

2006-07
-Coordinatore Locale del Network Europeo "Superstring Theory" MRTN-CT-2004-512194
-Membro dell'Advanced Grant dell'European Reserach Council n.226455 "Superfields" (diretto dal Prof sergio Ferrara)
-Coordinatore Locale del Gruppo IV della Sezione INFN di Roma "Tor Vergata" dal 2002 al 2007
-Coordinatore Locale dell'Iniziativa Specifica TS11 dal 2004 al 2007
- Responsabile Nazionale dell'Iniziativa Specifica dell'INFN TV12 (poi ST&FI) "String Theory and Fundamental Interactions" dal 2008 al 2016
-Partecipante allo scambio "Bruno Rossi" INFN-MIT (1999, 2000, 2001, 2004),
- Membro del progetto INTAS 03-51-6346 “Strings, Branes and Higher-Spin Gauge Fields" e al contratto NATO PST.CLG.978785

Referaggio:
Nuclear Pysics B, JHEP, Physics Letters, Physics Reports, Nuovo Cimento, International Journal of Modern Physics, Classical and Quantum Gravity, Modern Physics Letters

Attività Didattica:
-Anno scolastico 1988-89: “Fisica”, Liceo Scientifico Luigi Pirandello di Roma.
-Anno scolastico 1989-90: “Matematica”, Liceo Scientifico dell'Istituto San Giovanni Evangelista di Roma.
-Anno accademico 1991-92: Esercitazioni di Laboratorio “Esperimentazione Fisica I”.
-Maggio 1992: ciclo di 15 ore di lezione su "Applicazioni della Teoria dei Gruppi alla Fisica delle Particelle", corso di Dottorato di Ricerca in Fisica dell'Università di Roma "La Sapienza".
-Anni accademici 1992-93, 1993-94 e 1994-95: Esercitazioni di “Metodi Matematici della Fisica”
-Aprile 1995: ciclo di 12 ore di lezione su "Calcoli Istantonici in Teorie di Gauge Supersimmetriche", corso di Dottorato di Ricerca in Fisica dell'Università di Milano.
-Giugno 1995: ciclo di 15 ore di lezione su "Teorie Supersimmetriche e Supergravità", corso di Dottorato di Ricerca in Fisica dell'Università di Roma "Tor Vergata".
-Anno accademico 1995-96 (secondo semestre): supplenza del corso di “Relatività Generale”, corso di Laurea in Fisica dell'Università di Roma "Tor Vergata".
-Anni accademici 1995-96, 1996-97 e 1997-98: Esercitazioni di “Istituzioni di Fisica Teorica”.
-Anni accademici 1996-97 e 1997-98: supplenza del corso di “Teoria dei Campi”, corso di Laurea in Fisica dell'Università di Roma "Tor Vergata".

-Anni accademici 1998-99, 1999-2000 e 2001-02: corso di “Istituzioni di Fisica Teorica”.
-Anni accademici 2002-03, 2003-04, 2004-05, 2005-06, 2006-07: corso di “Meccanica Quantistica 1” (10 CFU) e corso di "Teorie Relativistiche e Supergravità" (6 CFU).
-Maggio 1999 ciclo di lezioni su "Monopoli e Istantoni" per il Dottorato in Fisica dell'Università di Parma.
-Anno accademico 2000-01 (congedo trascorso al DAMTP) ciclo di 6 lezioni di 2 ore su "AdS/CFT correspondence".
-Dicembre 2006 Raychaudhuri Memorial Lecture: "String Theory Unification" presso l'Indian Association for the Cultivation of Science, Calcutta 700 032 INDIA.
-Maggio 2001 ciclo di lezioni su “Holographic Renormalization" per la Summer School, ICTP, Trieste.
-Settembre 2003, ciclo di lezioni su "Stringhe e D-brane" per il Seminario Nazionale dell'Università di Parma.
-Anni accademici 2008-09, 2009-10, 2013-14: titolare del corso di "Teorie Relativistiche e Supergravità" (6 CFU).
- Anni accademici 2013-14, 2014-15, 2015-16 e 2016-17: titolare dei corsi “Teoria dei Campi e Particelle 1 e 2” (6+6 CFU).

Studenti:
Carlo Nicola Colacino (Laurea, 1997)
Carlo Angelantonj (Dottorato 1998, cotutela con Prof. A. Sagnotti)
Stefano Kovacs (Dottorato 1999, cotutela con Prof. G. C. Rossi)
Andrea Lionetto (Laurea, 2000)
Alessandro Marchetti (Laurea, 2002)
Maurizio Prisco (Laurea, 2003)
Oswaldo Zapata (Dottorato, 2004)
Federico Piazzon (Laurea Triennale, 2005)
Gabriele Rizzo (Laurea Triennale, 2006)
Alessio Venanzio Santini (Laurea V.O. 2006)
Elisa Trevigne (Dottorato, 2007)
Daniel Ricci Pacifici (Laurea Triennale, 2007)
Luca Lopez (Laurea Triennale, 2010)
Marine Samsonyan (Dottorato, 2011)
Paolo Teresi (Laurea Magistrale 2012)
Dario Consoli (Laurea Triennale, 2012; Laurea Magistrale, 2015)
Gianluca Inverso (Dottorato, 2013)
Andrea Nardecchia (Laurea Triennale, 2014)
Paolo Bezzi (Laurea Triennale, 2015)
Andrea Guerrieri (Dottorato, 2017)
Lorenzo Pieri (Dottorato, 2018)

Organizzazione Scuole e Congressi:
-EU Network Meeting "String theory, quantum gravity and the unification of the fundamental interactions", Roma, 21-26 settembre, 1992. EC-RTN
-Workshop "Superstring Theory" Casa Bianca (SI), 8-12 aprile, 2003;
-"The Legacy of Supergravity" (World Year of Physics 2005), Villa Mondragone, Frascati, 6-8 giugno, 2005;
-"String Phenomenology 2007", LNF, Frascati, 4-8 giugno, 2007;
-Meeting "Theories of the Fundamental Interactions", Villa Mondragone, Frascati, 26-28 giugno, 2008;
-GGI Workshop "New Perspectives in String Theory", Arcetri (FI), 6 aprile - 19 giugno, 2009;
-"Strings '09", Roma, 22-26 giugno, 2009;
-Meeting "Theories of the Fundamental Interactions", Perugia, 24-26 giugno, 2010;
-Meeting "Theories of the Fundamental Interactions", SISSA, Trieste, 2012;
-Meeting "Theories of the Fundamental Interactions", Napoli, 2014;
-Marcel Grossmann Meeting, MG14, Roma, 12-18 luglio 2015;
-Membro delle International Advisory Committees di “Strings” (2013, 2014, 2015) "String Phenomenology" (2008), "Marcel Grossmann Meeting" (1997, 2000, 2003, 2006, 2009, 2015)

Partecipazione a Scuole e Congressi:
IV Marcel Grossmann Meeting, Roma, giugno 1985. Scuola INFN di Studi Avanzati in Fisica Nucleare e Subnucleare, Frascati e L'Aquila, 1987. Spring School on Superstrings, ICTP, Trieste, aprile 1987. Spring School on Superstrings, ICTP, Trieste, aprile 1988. Conference on String Theory, Istituto di Alta Matematica, Roma, giugno 1988. Summer School on Fields, Strings and Critical Phenomena, Les Houches, luglio 1988. Workshop on Conformal Field Theory, ICTP Trieste, ottobre 1989. Incontro Triangolare Roma-Parigi-Utrecht, Roma, aprile 1990. Physics Beyond the Standard Model, LNF Frascati, dicembre 1990. Incontro Triangolare Roma-Parigi-Utrecht, Parigi, maggio 1991. Incontro Triangolare Roma-Parigi-Utrecht, Creta, giugno 1992. Conferenza String Theory, Quantum Gravity and the Unification of the Fundamental Interactions, Roma, settembre 1992. Incontro Triangolare Roma-Parigi-Utrecht, Amsterdam, maggio 1993. Edoardo Amaldi Conference on Gravitational Waves, Frascati, giugno 1993. Incontro Triangolare Roma-Parigi-Utrecht, Copenhagen, giugno 1994. VII Marcel Grossman Meeting, Stanford, luglio 1994. XI Convegno Nazionale della Societa Italiana di Relatività Generale, Trieste, settembre 1994. Incontro dei Giovani Fisici Teorici, Cortona, maggio 1995. Italian-Korean Meeting on Relativistic Astrophysics, Roma, luglio 1995. Conferenza S-Duality in String Theory, ICTP Trieste, giugno 1995. Conferenza S, T and U Dualities, CERN, Ginevra, dicembre 1995. Incontri di Fisica Teorica, IAASS, Vietri, aprile

1996. Incontro Triangolare Roma-Parigi-Utrecht, Roma, aprile 1996. 12th Italian Conference on General Relativity and Gravitational Physics, Roma, settembre 1996. Incontri di Fisica Teorica, IAASS, Vietri, aprile 1997. VIII Marcel Grossmann Meeting, Gerusalemme, giugno 1997. Incontro Triangolare Roma-Parigi-Utrecht, Parigi, agosto 1997. 5th Italian - Korean Symposium on Relativistic Astrophysics, Seoul, Suanbo, Corea, settembre 1997. Abdus Salam Memorial Meeting, ICTP, Trieste, novembre 1997. Strings 1998, S. Barbara, luglio 1998. Extended Workshop on String Theory, SISSA, Trieste, luglio-agosto 1998. RFBR-INTAS Summer School on Advances in Quantum Field Theory, Statistical Mechanics and Dynamical Systems, Como, settembre 1998. Strings 1999, Potsdam, luglio 1999. Extended Workshop on String Theory, SISSA, luglio-agosto 1999. Summer Workshop on String Theory, Aspen, agosto-settembre 1999. 9th Marcel Grossmann Meeting (MG 9), Roma, luglio 2000. International Conference on Supersymmetry and Quantum Field Theory (SSQFT 2000), Kharkov, Ukraine, luglio 2000. Semestre des Cordes, IHP, Paris, giugno 2001. Summer Workshop on String Theory, Benasque, luglio 2001. Strings, D-branes and CFT's, DESY, Hamburg, settembre 2001. Eurostrings '06, Cambridge, april 2002. EU Superstring Network Meeting, Schloss Rindberg, giugno 2002. 3rd International Sakharov Conference on Physics, Mosca, Russia, giugno 2002. Strings 2002, Cambridge, luglio 2002. EU Superstring Network Meeting, Casa Bianca (SI), aprile 2003. EU Conference on String Theory, Bad Herrenalb, giugno 2003. 10th Marcel Grossmann Meeting (MG10), Rio de Janeiro, luglio 2003. Workshop on Higher Spin Gauge Theories, Brussels, maggio 2004. Strings 2004, Paris, giugno 2004. Strings at CERN, Ginevra, luglio 2004. 16th SIGRAV Conference on General Relativity and Gravitational Physics (SIGRAV04), Vietri sul Mare, settembre 2004. RTN Workshop on the Quantum Structure of Space-time and the Geometric Nature of Fundamental Interactions, Kolymbari, Crete, Greece, 5-10 Sep 2004. The Legacy of Supergravity, Villa Mondragone, giugno 2005. String Phenomenology '05, Munich, June 2005. Strings 2005, Toronto, July 2005. 4th Meeting on Constrained Dynamics and Quantum Gravity (QG05), Cala Gonone, settembre 2005. Eurostrings 2006, Cambridge, aprile 2006. GGI Workshop Beyond the Standard Model, Arcetri (FI), maggio 2006. Integrability in QFT, Bologna, giugno 2006. 11th Marcel Grossmann Meeting, Berlino, luglio 2006. KITP Workshop e Conferenza, String Phenomenology '06, S. Barbara, agosto 2006. EU Superstring Network School, Heraklion, Creta,ottobre 2006. EU Network Meeting on Phenomenology beyond the Standard Model, Pisa, novembre 2006. Indian Strings Meeting, Puri, Orissa, INDIA dicembre 2006. GGI Workshop, Arcetri (FI), maggio 2007. String Phenomenology '07, LNF, Frascati, giugno 2007. Eurostrings '07, Kolymbari, Creta, luglio 2007. Workshop on D-brane Instantons, Munich, novembre 2007. PRIN Meeting, SNS, Pisa, dicembre 2007. Meeting on String Vacuum Selection, Liverpool, marzo 2008. String Phenomenology '08, Philadelphia, maggio 2008. INFN Meeting Theories of the Fundamental Interactions, Villa Mondragone,

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Alessandro Cianchi

Curriculum vitae

Rome, 10/11/2017

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Part I – General Information

Full Name	**Alessandro Cianchi**
Date of Birth	Sep 27th, 1970
Place of Birth	Rome (Italy)
Citizenship	Italian
E-mail	Alessandro.Cianchi@uniroma2.it
Spoken Languages	Italian (mother tongue), English
National Scientific Qualification for Associated Professor	02/A1 – 02/B3 (now 02/D1)

Part II – Education

Type	Institution	Notes (Degree, Experience …)
University graduation	Sapienza University of Rome	Physics
Post-graduate studies	CERN Accelerator School, Oxford (UK)	Course on General Accelerator Physics, Intermediate Level
PhD	University of Rome Tor Vergata	Physics

Part III – Appointments

- **IIIA – Academic Appointments/duties**

Start	End	Institution	Position
04/2008	Today	University of Rome Tor Vergata	Assistant Professor (Ricercatore Universitario Confermato a tempo indeterminato) at the Physics Department
12/2002	12/2004	University of Rome Tor Vergata	Research grant (Assegno di Ricerca) on Experimental techniques for accelerators at the Physics Department
09/2016	09/2016	Sapienza University of Rome	Member of the selection board for the PhD in Accelerator Physics
02/2015	02/2015	Sapienza University of Rome	Member of the committee for the final exam of PhD in Electromagnetism and Mathematics for engineering
01/2016	01/2016	University of Milan	Member of the committee for the final exam of PhD in Physics
2017	Today	University of Rome Tor Vergata	Member of Professor Board of the PhD in Physics
2017	Today	Cern Accelerator School	Member of Professor Board of course in accelerator diagnostics
		University of Rome Tor Vergata	Supervisor of theses in Physics (bachelor and master degrees), Supervisor of PhD thesis in Physics
		University of Rome Tor Vergata	Member of several boards for selection of research grant (assegno di ricerca) at Physics Department and NAST centre
2016	Today	MIUR	Referee of PRIN and VQR

- **IIIB – Research Appointments**

<u>Research activity in qualified international institutions</u>

Start	End	Institution	Position
06/1997	12/1997	Fermilab (Batavia, USA)	Guest Scientific Researcher
02/1997	Today	DESY (Hamburg)	Several experiments in the INFN-DESY collaboration

<u>Research activity in qualified national institutions</u>

Start	End	Institution	Position
01/2005	03/2008	INFN-Roma Tor Vergata	Fixed term Researcher on particle accelerators activities
2008	Today	INFN-Roma Tor Vergata	Association appointment renewed yearly on particle accelerators activities

Part IV – Integration in the international community

Journal Referee and Editor

Start	End	Institution	Position
2016	Today	Elsevier	Editor Proceedings Conference Physics and Applications of High Brightness Beams, Cuba (2016)
2014	Today	Optical Society of America	Referee of Journal of the Optical Society of America B
2013	Today	American Physical Society	Referee of Physical Review - Accelerators and Beams (former PRST-AB)
2012	Today	American Physical Society	Referee of Physical Review Letters
2010	Today	Elsevier	Referee of Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment

Conference Program committee

Date	Conference	Place
2016	IBIC (international Beam Instrumentation Workshop	Barcelona (Spain)
2016	Physics and Applications of High Brightness Beams	Havana (Cuba)
2014	6th microbunching instability workshop	Trieste (Italy)
2013	1st European Advanced Accelerator Concept workshop	Isola d'Elba (Italy)

Invited Talk

Date	Conference	Place
2017	American Physical Society annual meeting	Milwaukee (to do in October 2017)
2016	Physics and Applications of High Brightness Beams	Havana (Cuba)
2015	SPIE Optics Optoelectronics: Advances in X-ray Free-Electron Laser Instrumentation	Prague (Check Republic)
2015	2nd European Advanced Accelerator Workshop	Isola d'Elba (Italy)
2014	100° congresso SIF	Pisa (Italy)
2013	Physics and applications of high brightness beams	San Juan, Portorico
2013	3rd International Conference Frontiers in Diagnostic Technologies (Frascati)	Frascati (Italy)
2013	99° congresso SIF	Trieste (Italy)
2009	The Physics and Applications of High Brightness Electron Beams	Maui, Hawaii
2007	DIPAC- Diagnostic and instrumentation for Particle accelerator conference	Venice (Italy)

Contributed talk

Date	Conference	Place
2012	Free Electron Laser Conference	Nara (Japan)
2012	2rd International Conference Frontiers in Diagnostic Technologies (Frascati)	Frascati (Italy)
2011	International Symposium on Radiation From Relativistic Electrons in Periodic Structures (RREPS)	London (UK)
2003	International Conference Plasma 2003	Warsaw (Poland)

Coordination of national and international researcher teams

Start	End	Institution	Position
11/2016	Today	University of Rome Tor Vergata	Coordination of diagnostics group in Work Package 5 in the project "Compact European Plasma Accelerator with superior beam quality" (EUPRAXIA); Horizon 2020
2017	Today	INFN	Coordination of diagnostics group in project EUSPARC
2007	Today	INFN - University of Rome Tor Vergata	Coordination of Measurements, Diagnostics and Instrumentation at SPARC_LAB
03/2012	10/2014	INFN	Coordination of diagnostics group for the Compton Gamma Source being built in the Extreme Light Infrastructure for Nuclear Physics (ELI-NP), Magruele (Romania)
2010	2015	INFN	National coordination of the Experiment ODRI and ODRI2D, group V INFN
2013	Today	INFN	Local coordination at Tor Vergata of the Experiment SL_COMB
		University of Rome Tor Vergata, Centro NAST, Fondazione Inuit, General Tecnica, DSTech	Scientific Responsible for the project TECNOMUSE (TECNOlogia MUOnica per la SicurEzza nei porti) submitted to Lazio local government waiting for approval.

Part V – Teaching experience

- **Va– Lectures at Tor Vergata University**

Year	Faculty	Lecture/Course
2011-Today	Physics	Particle Accelerators for Science and Interdisciplinary Applications (also available in Italian upon request)
2013-Today	Enterprise engineering	Physics I (online) for management engineering
2014-Today	Enterprise engineering	Physics II (online) for management engineering
2008/09-2009/10	Physics	Computer Science introduction (in Italian) for Meteorology and Atmospheric Physics
2008/09-20014/15	Physics	Assistant Professor for Lab3

- **Vb– International University level teaching experience**

Year	School/Institution	Place
2017	Cern Accelerator School (Advanced Level)	London (Uk) to do in September 2017
2015	Cern Accelerator School (Intensity Limitations in Particle beams)	Geneva (Switzerland)
2015	Cern Accelerator School (Advanced Level)	Warsaw (Poland)
2013	Cern Accelerator School (Advanced Level)	Chios (Greece)
2011	Cern Accelerator School (Advanced Level)	Darmstadt (Germany)

Part VI - Funding Information

VI A – Grants as **Principal Investigator**

Year	Title	Program	Grant Value
2013-15	Odri 2D Experiment	**National Scientific Committee V** of INFN (national responsible)	About 50k€
2010-12	Odri Experiment	**National Scientific Committee V** of INFN (national responsible)	About 80k€

VI B – Grants as **Investigator**

Year	Title	Program	Grant Value*
2017/20	Plasmar	**Premiale MIUR (still waiting official communication)**	~ 70k€
2017	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 20k€
2016	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 4k€
2015	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 100k€
2014	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 60k€
2013	NTA-SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 60k€

* This is not the total amount but the part of the grant for Tor Vergata unit research that Alessandro Cianchi managed.

Part VII – Summary of Scientific Achievements

The scientific activity quality parameters computed on the completely scientific production are:

Product Type	Number	Data Base	Start	End
Papers (Journals and conferences)	185	SCOPUS	1999	2017
Papers (Journals)	77*	SCOPUS	1999	2017
Paper (conference)	108	SCOPUS	1999	2017

*77 are indexed. In my list, there are 84 papers.

Total Citations	**2780** (SCOPUS)
Total Citations last 10 years	**1866** (SCOPUS)
Hirsch (H) index	**21**(SCOPUS)
Hirsch (H) index 10 anni	**17** (SCOPUS)

Part VIII – Research Activities

Keywords	Brief Description
Brief Introduction	Particle accelerators were invented roughly 90 years ago and nowadays they are used in industrial applications (>27000 units), medicine (>14000 units) and fundamental as well as applied research (>1200 units) (source DOI: 10.1134/S1063778814100032). Particle accelerator development is the result of a worldwide R&D effort to reduce their cost and sizes as well as to enlarge the number of applications. Moreover, a new class of compact machines are emerging: plasma accelerators. They are based on the capability of a plasma to sustain accelerating gradients three orders of magnitude higher than those in conventional accelerator. This approach can represent a real breakthrough in the conventional technology, allowing the reduction of the size of the machine of a huge factor. This approach will pave the way to small and compact machines in hospitals, industries, universities, museums, for a wide range of applications. An old statement says that an accelerator is as good as its diagnostics. Alessandro Cianchi (AC) has spent most of his time in this field, working in several labs (LNF, DESY, Fermilab) and developing new ideas and concepts for the measurements of the properties of extremely high intense and high brightness beams. The facilities for advanced radiation sources, with wavelength ranging from THz to X rays, are based on FEL (Free Electron Laser)

	or Compton effect, driven by such kind of beams, to serve different fields of science from basic research to applied physics. He is also now focused on new plasma accelerators. His experience on conventional and novel diagnostics and his skills provide him with invitation to give talks in international conferences and lectures at the Cern Accelerator School. Thanks to his mature experience, he has been invited to join conferences program committees and review papers for high impact factor journals. In addition, he leads the diagnostics group at SPARC_LAB, in the European project EUPRAXIA, and in the EUSPARC project in Frascati to build a new accelerator. Recently he started a collaboration with several other groups to develop a new concept of very compact neutron source, based on plasma accelerator. In the past, he participated to the technical development of Superconductive Radio Frequency (SRF) accelerating structure, an experience that introduced him to material science, thin films, high current discharge and vacuum technology.
Plasma accelerators, Eupraxia	Plasma-based accelerators represent the new frontier for the acceleration of high quality, i.e. high brightness, electron beams due to their capability to sustain extremely large accelerating gradients. In conventional Radio-Frequency (RF) linear accelerators, accelerating electric fields are currently limited to about 100MV/m, mainly due to breakdown occurring on the metallic walls of the devices. Ionized plasmas, however, can sustain electron plasma waves with electric fields three orders of magnitude higher than actual RF technologies. Moreover, the accelerating field strength is tuneable by adjusting the plasma density. Even though the principle of plasma-based acceleration has been proven by several groups, the produced beams still suffer from large angular divergence, large energy spread, poor reproducibility, which prevent their use as an alternative to conventional RF accelerators which typically provide stable and high quality electron beams. There are many approaches to solve the problem, some rely on linacs that inject charge into a plasma channel, using either a laser or an electron bunch as driver to transfer energy to the plasma and create the accelerating wave. Others are based on high power lasers (hundreds of TW) to directly drive the plasma electrons, avoiding any RF machine. The Eupraxia consortium consists of 16 partner institutions in EU and another 22 associated partner institutions in Europe, Asia and US. This project brings together top accelerator scientists in order to develop a plasma-based accelerator with high quality beam, suitable to drive several applications for research and industry applications. AC is the representative of Tor Vergata University inside the collaboration and he is leading the electron beam diagnostics group.

External injection, PWFA beam driven	A possible approach towards plasma-accelerated high-brightness electron beams relies on the use of the plasma only as the active media, injecting electrons into a pre-formed plasma channel. A first scheme consists in injecting a witness electron bunch in a plasma where the plasma wave is excited by a high-power laser pulse, i.e. external injection in a Laser Wake Field Accelerator (LWFA) [J12], [J32] and [J15]. The second scheme is based on the induction of coherent plasma oscillations with multiple electron bunches, which is called resonant Plasma Wake Field Accelerator (PWFA). Such idea relies on using a comb-like beam, i.e. a train of equidistant bunches, to increase the accelerating electric field. The additional benefit of resonant PWFA is the use of lower charge bunches in the train with respect to traditional PWFA, with the advantage of a better control of acceleration and transport [J4]. The proof of principle experiment of resonant wake field acceleration has triggered improvements in several field, towards a complete plasma machine where also magnets are replaced by plasma lenses. For instance among the others there are the plasma generation schemes [J33], active plasma lenses for symmetric beam focusing [J1], the improvements in jitter and synchronisation [J11]. In addition, there is a lot of work in standard bunch measurement [J6, J39] as well as in non-intercepting beam diagnostics [J34]. Efforts are ongoing also in measurement the plasma channel properties with spectroscopic [J14, J19] and opto-acoustic [J17] methods. In all of these fields AC has been deeply involved, proposing and realising also innovative ideas. Moreover, to support the plasma source commissioning, simplified (but accurate) models are necessary to properly choose the machine working point. Those models, before being used, must be assessed against accurate Particle In Cell simulation [J35].
LPA (Laser Plasma Acceleration)	At the SPARC_LAB high intensity laser, FLAME, a different scheme for plasma acceleration is also under investigation. A 200 TW class laser ionizes a supersonics gas jet. At the same time, the ponderomotive force expels electrons and create a bubble zone where only positive ions remains. The extremely high electric field in the bubble inject electrons from the rear side, accelerating at the same time at high gradient. A lot of work is needed in order to improve the quality of these beams, but the potentiality to avoid any RF installation to produce a high-energy beam is fascinating. In addition, this class of beams requires a new paradigm in diagnostics, being the usual techniques very difficult to be applied. AC is focus on this task [J3], [J6].
TNSA (Target Normal Sheath acceleration)	Also protons can be produced by intense laser interaction with the matter. At FLAME the beam is focused on a metallic screen down to few um to achieve power density in the order of 10^{19} W/cm^2. Fast electrons are accelerated through the material by the laser. These electrons penetrate the target ionizing other particles and escaping from the other side. In this moment, they build up a very strong electric field, in the order of TV/m. This field extracts protons and ions from the rear surface, producing an intense beam of particles. There are

	many studies to use these particles for medical application for instance. The study of the physics of the interaction is fundamental to improve the quantity of the particles and their properties. At FLAME several studies have been already performed [J8], [J13], [J18] using Electro Optical diagnostics developed for SPARC_LAB during a PhD thesis that AC advised [J34].
SPARC_LAB other activities	AC has been working in the project since the beginning, participating in the design, commissioning, and operation of the machine, and learning about all machine subsystems. The SPARC photoinjector offers a wide range of challenges, especially for the diagnostics. AC successfully leaded the development of the so-called Emittance-Meter, a device able to measure the emittance (i.e. the area of the particle beam in the transverse phase space) oscillation in a photoinjector. [J61], [J65]. This measurement was particularly relevant because it has been the first experimental demonstration of the double emittance minimum theory. It is worth to mention that on this dynamics scheme are based all the existing X-FEL machines worldwide.
Comb-like beams	One of the most significant achievements of the SPARC_LAB test facility is the possibility to produce and manipulate comb-like beams, i.e. a train of pulses with high repetition rate, about 1 THz. This kind of trains are very useful in generating two colours FEL radiation, narrow band THz radiation and they are of great interest in the plasma acceleration. AC developed a system to measure the individual transverse properties of a train of bunches with THz repetition rate, using a combination of a Radio Frequency deflector and a spectrometer [J25], [J2].
FEL developments	SPARC_LAB contributed to develop and test innovative ideas on Free Electron Laser schemes**,** which have been afterword applied in larger scale FEL facilities. For instance, SPARC_LAB introduced the undulator tapering [J54] to compensate energy spread or demonstrated the generation of a super radiant pulse in the long radiator of a single stage cascaded FEL, by seeding the modulator with an external laser [J46]. Seeded FELs can operate either in the amplifier “direct seeding” scheme, or in the high gain harmonic generation configuration, where the seed in a first undulator (modulator) is used to induce an energy-density modulation in the electron beam longitudinal phase space. This bunched beam then emits a higher order harmonics in a following undulator (radiator). This scheme can be repeated in a multiple stage cascade of modulators and radiators, extending the operation wavelength toward a range where seed sources are not available [J40]. The versatility of the SPARC photoinjector allowed also to send in the FEL undulator a train of bunches, resulting in a two colour FEL radiation [J37], time modulated FEL radiation [J38] and seeded two colours radiation [J24]. In all of these schemes, and especially those that uses the comb-like beams, the individual diagnostics of the transverse properties of the beam is fundamental, in order to proper match the beam transverse dimensions to the undulator chain. Several of these schemes

	were pioneered at SPARC_LAB and they are now used in several other laboratories for pump-probe FEL experiments.
THz radiation source	The generation of THz radiation at SPARC_LAB relies on the usage of sub-ps high brightness electron bunches when a broadband radiation is needed [J44], while longitudinally modulated electron beams allow for tuneable narrow-band radiation [J23]. The generation is quite efficient since the velocity bunching [J56] regime, needed to compress the beam, imposes a longitudinal phase space distortion, leading to asymmetric current profiles with sharp rising charge distribution at the bunch head; therefore, high frequency (THz) radiation can be emitted if the bunch goes across a radiator (coherent transition radiation) [J20]. The resulting THz radiation is more intense than other sources and it has been used for advanced material studies [J16]. AC brought his personal experience of CTR emission and detection in this experiment.
Compton Source	High brightness linacs are used also in X and Gamma ray source based on Compton back scattering between electron and counter-propagating laser pulses. A possible design has been proposed in [J43] investigating the beam dynamics as well as the issues due to the necessity of multi-bunch operation to increase the luminosity. A single bunch, proof of principle experiment has been done at SPARC_LAB [J10]. The interest of such kind of machine is in particular for medical application, because they are a source of quasi-monochromatic X-rays. The Gamma Beam Source according to [43] is being built in Romania under the ELI-NP project supported by EU. One of the most relevant issues is the need of multi-bunch, high charge beams affecting the design and the operation of accelerating structures and diagnostics [J21]. AC was the responsible of the diagnostics work package for more than two years following all the design of the machine. He was also one of the three members of the budget committee. He used his experience in the design of the ELI machine to build the interaction region of the Compton source at Frascati.
DESY related activities	AC has been collaborating with DESY (Hamburg) since more than 20 years, spending weeks (sometimes months) every year there. He focused on the properties of OTR (Optical Transition Radiation) and all of its derivatives.
Incoherent OTR based diagnostics	OTR is emitted when a charge passes through the interface between two media with different index of refraction. A silicon aluminate screen is the usual choice. It has been widely used in FLASH FEL to measure the beam transverse phase properties [J72], [J77]. Alessandro Cianchi (AC) contributed in the commissioning and the installation of all the optical diagnostics in the machine. In particular, he realized a time resolved measurement in order to discriminate each single pulse at MHz repetition rate. He successfully applied this technique also at Fermilab (Batavia, USA). FLASH (at the beginning the name was Tesla

	Test Facility) has been the first machine to have transverse diagnostics based only on OTR.
Coherent TR diagnostics and source	Since the beginning of his activities, AC was also involved in the study of the TR coherent emission (CTR), and all the issues related to physics of the emission [J79], [J84]. In particular, he focused on the use of CTR as a powerful tool to investigate the longitudinal profile of an electron bunch [J83].
ODRI (Optical Diffraction Radiation Interference)	High brightness and high repetition rate beams can severely damage or destroy Intercepting diagnostics. For such beams, the diffraction radiation (DR) is a good candidate. The particle goes through a hole in a metallic screen, while the co-propagating electric field interacts with the material around the hole. The analysis of the angular distribution of the radiation reveals important details about beam transverse phase space. AC has been the principal investigator of two experiments, in collaboration between INFN and DESY, that successfully measured first the beam size [J51] and later also the emittance [J27] without intercepting or disturbing the beam. Other groups are now interested in this diagnostics and they are implementing it in their project.
Compact neutron source	The quality of the LPA beams are not yet satisfactory for many applications. However, a neutron source can accept quite a wide range of energy spread and pointing instability in the primary beam because in any case the neutrons must be later moderate. A laser based neutron source can be very compact and can be easily hosted in Industries, universities, and small labs. The flux could be comparable with some of the so-called CANS (Compact Accelerator Neutron Source). A wide range of applications can be foreseen, from PGAA (Prompt Gamma Activation Analysis) to image radiography among the others, in different field, as for instance industrial material tests, cultural heritage, detector R&D. An effort to establish a wide collaboration has been very recently started, called ALADIN (Applications of Laser-Driven ions and Neutrons), connecting people of 10 institution worldwide. AC is studying the possibility to perform experiments at the SPARC_LAB high intensity laser, FLAME.
UHV cathodic arc deposition	AC worked on this topic as a young researcher. The main idea was to use the cathodic arc discharge in UHV (Ultra High Vacuum) to deposit a thin niobium film on a copper cavity substrate. Niobium has poor mechanical quality at liquid helium temperature. Using copper as a substrate can alleviate this problem. The main difficulty was to have a discharge in UHV, the only environment that can guarantee a high quality niobium film deposition [J78], [J76], [74]. AC focused on several aspects of this experiment in particular on recognizing and filtering macroparticles that can leave the cathode and once deposited on the sample can softener the structure [J71]. The experiment, funded both by EU in FP6 and INFN, successfully deposited and measured one cavity cell [J70], [J69].

List of peer reviewed papers on international Journals (total number 84)

[J1]. Pompili, R., et al., *Experimental characterization of active plasma lensing for electron beams*, Appl. Phys. Lett. 110, 104101 (2017);

[J2]. Zhu, J., et al., Misalignment measurement of femtosecond electron bunches with THz repetition rate, Physical Review Accelerator and Beams, 20, 042801 (2017)

[J3]. Curcio, A., et al., "Trace-space reconstruction of low-emittance electron beams through betatron radiation in laser-plasma accelerators", Physical Review Accelerator and Beams, 20, 012801 (2017)

[J4]. Chiadroni, E., et al. "Beam manipulation for resonant plasma wakefield acceleration." Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment (2017).

[J5]. **Cianchi, A**., et al. "Observations and diagnostics in high brightness beams." Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 829 (2016): 343-347.

[J6]. **Cianchi, A**., et al. "Transverse emittance diagnostics for high brightness electron beams." Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment (2016).

[J7]. Shpakov, V., et al., "Betatron radiation based diagnostics for plasma wakefield accelerated electron beams at the SPARC_LAB test facility", Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 829 (2016): 330-333.

[J8]. Pompili, R., et al. "Femtosecond dynamics of energetic electrons in high intensity laser-matter interactions." Scientific Reports 6 (2016).

[J9]. Villa, F., et al. "Laser pulse shaping for high gradient accelerators." Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 829 (2016): 446-451.

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Alessandro Cianchi

Curriculum vitae

Rome, 10/11/2017

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Part I – General Information

Full Name	**Alessandro Cianchi**
Date of Birth	Sep 27th, 1970
Place of Birth	Rome (Italy)
Citizenship	Italian
E-mail	Alessandro.Cianchi@uniroma2.it
Spoken Languages	Italian (mother tongue), English
National Scientific Qualification for Associated Professor	02/A1 – 02/B3 (now 02/D1)

Part II – Education

Type	Institution	Notes (Degree, Experience …)
University graduation	Sapienza University of Rome	Physics
Post-graduate studies	CERN Accelerator School, Oxford (UK)	Course on General Accelerator Physics, Intermediate Level
PhD	University of Rome Tor Vergata	Physics

Part III – Appointments

- **IIIA – Academic Appointments/duties**

Start	End	Institution	Position
04/2008	Today	University of Rome Tor Vergata	Assistant Professor (Ricercatore Universitario Confermato a tempo indeterminato) at the Physics Department
12/2002	12/2004	University of Rome Tor Vergata	Research grant (Assegno di Ricerca) on Experimental techniques for accelerators at the Physics Department
09/2016	09/2016	Sapienza University of Rome	Member of the selection board for the PhD in Accelerator Physics
02/2015	02/2015	Sapienza University of Rome	Member of the committee for the final exam of PhD in Electromagnetism and Mathematics for engineering
01/2016	01/2016	University of Milan	Member of the committee for the final exam of PhD in Physics
2017	Today	University of Rome Tor Vergata	Member of Professor Board of the PhD in Physics
2017	Today	Cern Accelerator School	Member of Professor Board of course in accelerator diagnostics
		University of Rome Tor Vergata	Supervisor of theses in Physics (bachelor and master degrees), Supervisor of PhD thesis in Physics
		University of Rome Tor Vergata	Member of several boards for selection of research grant (assegno di ricerca) at Physics Department and NAST centre
2016	Today	MIUR	Referee of PRIN and VQR

- **IIIB – Research Appointments**

<u>Research activity in qualified international institutions</u>

Start	End	Institution	Position
06/1997	12/1997	Fermilab (Batavia, USA)	Guest Scientific Researcher
02/1997	Today	DESY (Hamburg)	Several experiments in the INFN-DESY collaboration

<u>Research activity in qualified national institutions</u>

Start	End	Institution	Position
01/2005	03/2008	INFN-Roma Tor Vergata	Fixed term Researcher on particle accelerators activities
2008	Today	INFN-Roma Tor Vergata	Association appointment renewed yearly on particle accelerators activities

Part IV – Integration in the international community

Journal Referee and Editor

Start	End	Institution	Position
2016	Today	Elsevier	Editor Proceedings Conference Physics and Applications of High Brightness Beams, Cuba (2016)
2014	Today	Optical Society of America	Referee of Journal of the Optical Society of America B
2013	Today	American Physical Society	Referee of Physical Review - Accelerators and Beams (former PRST-AB)
2012	Today	American Physical Society	Referee of Physical Review Letters
2010	Today	Elsevier	Referee of Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment

Conference Program committee

Date	Conference	Place
2016	IBIC (international Beam Instrumentation Workshop	Barcelona (Spain)
2016	Physics and Applications of High Brightness Beams	Havana (Cuba)
2014	6th microbunching instability workshop	Trieste (Italy)
2013	1st European Advanced Accelerator Concept workshop	Isola d'Elba (Italy)

Invited Talk

Date	Conference	Place
2017	American Physical Society annual meeting	Milwaukee (to do in October 2017)
2016	Physics and Applications of High Brightness Beams	Havana (Cuba)
2015	SPIE Optics Optoelectronics: Advances in X-ray Free-Electron Laser Instrumentation	Prague (Check Republic)
2015	2nd European Advanced Accelerator Workshop	Isola d'Elba (Italy)
2014	100° congresso SIF	Pisa (Italy)
2013	Physics and applications of high brightness beams	San Juan, Portorico
2013	3rd International Conference Frontiers in Diagnostic Technologies (Frascati)	Frascati (Italy)
2013	99° congresso SIF	Trieste (Italy)
2009	The Physics and Applications of High Brightness Electron Beams	Maui, Hawaii
2007	DIPAC- Diagnostic and instrumentation for Particle accelerator conference	Venice (Italy)

Contributed talk

Date	Conference	Place
2012	Free Electron Laser Conference	Nara (Japan)
2012	2rd International Conference Frontiers in Diagnostic Technologies (Frascati)	Frascati (Italy)
2011	International Symposium on Radiation From Relativistic Electrons in Periodic Structures (RREPS)	London (UK)
2003	International Conference Plasma 2003	Warsaw (Poland)

Coordination of national and international researcher teams

Start	End	Institution	Position
11/2016	Today	University of Rome Tor Vergata	Coordination of diagnostics group in Work Package 5 in the project "Compact European Plasma Accelerator with superior beam quality" (EUPRAXIA); Horizon 2020
2017	Today	INFN	Coordination of diagnostics group in project EUSPARC
2007	Today	INFN - University of Rome Tor Vergata	Coordination of Measurements, Diagnostics and Instrumentation at SPARC_LAB
03/2012	10/2014	INFN	Coordination of diagnostics group for the Compton Gamma Source being built in the Extreme Light Infrastructure for Nuclear Physics (ELI-NP), Magruele (Romania)
2010	2015	INFN	National coordination of the Experiment ODRI and ODRI2D, group V INFN
2013	Today	INFN	Local coordination at Tor Vergata of the Experiment SL_COMB
		University of Rome Tor Vergata, Centro NAST, Fondazione Inuit, General Tecnica, DSTech	Scientific Responsible for the project TECNOMUSE (TECNOlogia MUOnica per la SicurEzza nei porti) submitted to Lazio local government waiting for approval.

Part V – Teaching experience

- **Va– Lectures at Tor Vergata University**

Year	Faculty	Lecture/Course
2011-Today	Physics	Particle Accelerators for Science and Interdisciplinary Applications (also available in Italian upon request)
2013-Today	Enterprise engineering	Physics I (online) for management engineering
2014-Today	Enterprise engineering	Physics II (online) for management engineering
2008/09-2009/10	Physics	Computer Science introduction (in Italian) for Meteorology and Atmospheric Physics
2008/09-20014/15	Physics	Assistant Professor for Lab3

- **Vb– International University level teaching experience**

Year	School/Institution	Place
2017	Cern Accelerator School (Advanced Level)	London (Uk) to do in September 2017
2015	Cern Accelerator School (Intensity Limitations in Particle beams)	Geneva (Switzerland)
2015	Cern Accelerator School (Advanced Level)	Warsaw (Poland)
2013	Cern Accelerator School (Advanced Level)	Chios (Greece)
2011	Cern Accelerator School (Advanced Level)	Darmstadt (Germany)

Part VI - Funding Information

VI A – Grants as **Principal Investigator**

Year	Title	Program	Grant Value
2013-15	Odri 2D Experiment	**National Scientific Committee V** of INFN (national responsible)	About 50k€
2010-12	Odri Experiment	**National Scientific Committee V** of INFN (national responsible)	About 80k€

VI B – Grants as **Investigator**

Year	Title	Program	Grant Value*
2017/20	Plasmar	**Premiale MIUR (still waiting official communication)**	~ 70k€
2017	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 20k€
2016	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 4k€
2015	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 100k€
2014	SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 60k€
2013	NTA-SL-COMB	**National Scientific Committee V** INFN (research unit responsible)	~ 60k€

* This is not the total amount but the part of the grant for Tor Vergata unit research that Alessandro Cianchi managed.

Part VII – Summary of Scientific Achievements

The scientific activity quality parameters computed on the completely scientific production are:

Product Type	Number	Data Base	Start	End
Papers (Journals and conferences)	185	SCOPUS	1999	2017
Papers (Journals)	77*	SCOPUS	1999	2017
Paper (conference)	108	SCOPUS	1999	2017

*77 are indexed. In my list, there are 84 papers.

Total Citations	**2780** (SCOPUS)
Total Citations last 10 years	**1866** (SCOPUS)
Hirsch (H) index	**21**(SCOPUS)
Hirsch (H) index 10 anni	**17** (SCOPUS)

Part VIII – Research Activities

Keywords	Brief Description
Brief Introduction	Particle accelerators were invented roughly 90 years ago and nowadays they are used in industrial applications (>27000 units), medicine (>14000 units) and fundamental as well as applied research (>1200 units) (source DOI: 10.1134/S1063778814100032). Particle accelerator development is the result of a worldwide R&D effort to reduce their cost and sizes as well as to enlarge the number of applications. Moreover, a new class of compact machines are emerging: plasma accelerators. They are based on the capability of a plasma to sustain accelerating gradients three orders of magnitude higher than those in conventional accelerator. This approach can represent a real breakthrough in the conventional technology, allowing the reduction of the size of the machine of a huge factor. This approach will pave the way to small and compact machines in hospitals, industries, universities, museums, for a wide range of applications. An old statement says that an accelerator is as good as its diagnostics. Alessandro Cianchi (AC) has spent most of his time in this field, working in several labs (LNF, DESY, Fermilab) and developing new ideas and concepts for the measurements of the properties of extremely high intense and high brightness beams. The facilities for advanced radiation sources, with wavelength ranging from THz to X rays, are based on FEL (Free Electron Laser)

	or Compton effect, driven by such kind of beams, to serve different fields of science from basic research to applied physics. He is also now focused on new plasma accelerators. His experience on conventional and novel diagnostics and his skills provide him with invitation to give talks in international conferences and lectures at the Cern Accelerator School. Thanks to his mature experience, he has been invited to join conferences program committees and review papers for high impact factor journals. In addition, he leads the diagnostics group at SPARC_LAB, in the European project EUPRAXIA, and in the EUSPARC project in Frascati to build a new accelerator. Recently he started a collaboration with several other groups to develop a new concept of very compact neutron source, based on plasma accelerator. In the past, he participated to the technical development of Superconductive Radio Frequency (SRF) accelerating structure, an experience that introduced him to material science, thin films, high current discharge and vacuum technology.
Plasma accelerators, Eupraxia	Plasma-based accelerators represent the new frontier for the acceleration of high quality, i.e. high brightness, electron beams due to their capability to sustain extremely large accelerating gradients. In conventional Radio-Frequency (RF) linear accelerators, accelerating electric fields are currently limited to about 100MV/m, mainly due to breakdown occurring on the metallic walls of the devices. Ionized plasmas, however, can sustain electron plasma waves with electric fields three orders of magnitude higher than actual RF technologies. Moreover, the accelerating field strength is tuneable by adjusting the plasma density. Even though the principle of plasma-based acceleration has been proven by several groups, the produced beams still suffer from large angular divergence, large energy spread, poor reproducibility, which prevent their use as an alternative to conventional RF accelerators which typically provide stable and high quality electron beams. There are many approaches to solve the problem, some rely on linacs that inject charge into a plasma channel, using either a laser or an electron bunch as driver to transfer energy to the plasma and create the accelerating wave. Others are based on high power lasers (hundreds of TW) to directly drive the plasma electrons, avoiding any RF machine. The Eupraxia consortium consists of 16 partner institutions in EU and another 22 associated partner institutions in Europe, Asia and US. This project brings together top accelerator scientists in order to develop a plasma-based accelerator with high quality beam, suitable to drive several applications for research and industry applications. AC is the representative of Tor Vergata University inside the collaboration and he is leading the electron beam diagnostics group.

External injection, PWFA beam driven	A possible approach towards plasma-accelerated high-brightness electron beams relies on the use of the plasma only as the active media, injecting electrons into a pre-formed plasma channel. A first scheme consists in injecting a witness electron bunch in a plasma where the plasma wave is excited by a high-power laser pulse, i.e. external injection in a Laser Wake Field Accelerator (LWFA) [J12], [J32] and [J15]. The second scheme is based on the induction of coherent plasma oscillations with multiple electron bunches, which is called resonant Plasma Wake Field Accelerator (PWFA). Such idea relies on using a comb-like beam, i.e. a train of equidistant bunches, to increase the accelerating electric field. The additional benefit of resonant PWFA is the use of lower charge bunches in the train with respect to traditional PWFA, with the advantage of a better control of acceleration and transport [J4]. The proof of principle experiment of resonant wake field acceleration has triggered improvements in several field, towards a complete plasma machine where also magnets are replaced by plasma lenses. For instance among the others there are the plasma generation schemes [J33], active plasma lenses for symmetric beam focusing [J1], the improvements in jitter and synchronisation [J11]. In addition, there is a lot of work in standard bunch measurement [J6, J39] as well as in non-intercepting beam diagnostics [J34]. Efforts are ongoing also in measurement the plasma channel properties with spectroscopic [J14, J19] and opto-acoustic [J17] methods. In all of these fields AC has been deeply involved, proposing and realising also innovative ideas. Moreover, to support the plasma source commissioning, simplified (but accurate) models are necessary to properly choose the machine working point. Those models, before being used, must be assessed against accurate Particle In Cell simulation [J35].
LPA (Laser Plasma Acceleration)	At the SPARC_LAB high intensity laser, FLAME, a different scheme for plasma acceleration is also under investigation. A 200 TW class laser ionizes a supersonics gas jet. At the same time, the ponderomotive force expels electrons and create a bubble zone where only positive ions remains. The extremely high electric field in the bubble inject electrons from the rear side, accelerating at the same time at high gradient. A lot of work is needed in order to improve the quality of these beams, but the potentiality to avoid any RF installation to produce a high-energy beam is fascinating. In addition, this class of beams requires a new paradigm in diagnostics, being the usual techniques very difficult to be applied. AC is focus on this task [J3], [J6].
TNSA (Target Normal Sheath acceleration)	Also protons can be produced by intense laser interaction with the matter. At FLAME the beam is focused on a metallic screen down to few um to achieve power density in the order of 10^{19} W/cm^2. Fast electrons are accelerated through the material by the laser. These electrons penetrate the target ionizing other particles and escaping from the other side. In this moment, they build up a very strong electric field, in the order of TV/m. This field extracts protons and ions from the rear surface, producing an intense beam of particles. There are

	many studies to use these particles for medical application for instance. The study of the physics of the interaction is fundamental to improve the quantity of the particles and their properties. At FLAME several studies have been already performed [J8], [J13], [J18] using Electro Optical diagnostics developed for SPARC_LAB during a PhD thesis that AC advised [J34].
SPARC_LAB other activities	AC has been working in the project since the beginning, participating in the design, commissioning, and operation of the machine, and learning about all machine subsystems. The SPARC photoinjector offers a wide range of challenges, especially for the diagnostics. AC successfully leaded the development of the so-called Emittance-Meter, a device able to measure the emittance (i.e. the area of the particle beam in the transverse phase space) oscillation in a photoinjector. [J61], [J65]. This measurement was particularly relevant because it has been the first experimental demonstration of the double emittance minimum theory. It is worth to mention that on this dynamics scheme are based all the existing X-FEL machines worldwide.
Comb-like beams	One of the most significant achievements of the SPARC_LAB test facility is the possibility to produce and manipulate comb-like beams, i.e. a train of pulses with high repetition rate, about 1 THz. This kind of trains are very useful in generating two colours FEL radiation, narrow band THz radiation and they are of great interest in the plasma acceleration. AC developed a system to measure the individual transverse properties of a train of bunches with THz repetition rate, using a combination of a Radio Frequency deflector and a spectrometer [J25], [J2].
FEL developments	SPARC_LAB contributed to develop and test innovative ideas on Free Electron Laser schemes**,** which have been afterword applied in larger scale FEL facilities. For instance, SPARC_LAB introduced the undulator tapering [J54] to compensate energy spread or demonstrated the generation of a super radiant pulse in the long radiator of a single stage cascaded FEL, by seeding the modulator with an external laser [J46]. Seeded FELs can operate either in the amplifier “direct seeding” scheme, or in the high gain harmonic generation configuration, where the seed in a first undulator (modulator) is used to induce an energy-density modulation in the electron beam longitudinal phase space. This bunched beam then emits a higher order harmonics in a following undulator (radiator). This scheme can be repeated in a multiple stage cascade of modulators and radiators, extending the operation wavelength toward a range where seed sources are not available [J40]. The versatility of the SPARC photoinjector allowed also to send in the FEL undulator a train of bunches, resulting in a two colour FEL radiation [J37], time modulated FEL radiation [J38] and seeded two colours radiation [J24]. In all of these schemes, and especially those that uses the comb-like beams, the individual diagnostics of the transverse properties of the beam is fundamental, in order to proper match the beam transverse dimensions to the undulator chain. Several of these schemes

	were pioneered at SPARC_LAB and they are now used in several other laboratories for pump-probe FEL experiments.
THz radiation source	The generation of THz radiation at SPARC_LAB relies on the usage of sub-ps high brightness electron bunches when a broadband radiation is needed [J44], while longitudinally modulated electron beams allow for tuneable narrow-band radiation [J23]. The generation is quite efficient since the velocity bunching [J56] regime, needed to compress the beam, imposes a longitudinal phase space distortion, leading to asymmetric current profiles with sharp rising charge distribution at the bunch head; therefore, high frequency (THz) radiation can be emitted if the bunch goes across a radiator (coherent transition radiation) [J20]. The resulting THz radiation is more intense than other sources and it has been used for advanced material studies [J16]. AC brought his personal experience of CTR emission and detection in this experiment.
Compton Source	High brightness linacs are used also in X and Gamma ray source based on Compton back scattering between electron and counter-propagating laser pulses. A possible design has been proposed in [J43] investigating the beam dynamics as well as the issues due to the necessity of multi-bunch operation to increase the luminosity. A single bunch, proof of principle experiment has been done at SPARC_LAB [J10]. The interest of such kind of machine is in particular for medical application, because they are a source of quasi-monochromatic X-rays. The Gamma Beam Source according to [43] is being built in Romania under the ELI-NP project supported by EU. One of the most relevant issues is the need of multi-bunch, high charge beams affecting the design and the operation of accelerating structures and diagnostics [J21]. AC was the responsible of the diagnostics work package for more than two years following all the design of the machine. He was also one of the three members of the budget committee. He used his experience in the design of the ELI machine to build the interaction region of the Compton source at Frascati.
DESY related activities	AC has been collaborating with DESY (Hamburg) since more than 20 years, spending weeks (sometimes months) every year there. He focused on the properties of OTR (Optical Transition Radiation) and all of its derivatives.
Incoherent OTR based diagnostics	OTR is emitted when a charge passes through the interface between two media with different index of refraction. A silicon aluminate screen is the usual choice. It has been widely used in FLASH FEL to measure the beam transverse phase properties [J72], [J77]. Alessandro Cianchi (AC) contributed in the commissioning and the installation of all the optical diagnostics in the machine. In particular, he realized a time resolved measurement in order to discriminate each single pulse at MHz repetition rate. He successfully applied this technique also at Fermilab (Batavia, USA). FLASH (at the beginning the name was Tesla

	Test Facility) has been the first machine to have transverse diagnostics based only on OTR.
Coherent TR diagnostics and source	Since the beginning of his activities, AC was also involved in the study of the TR coherent emission (CTR), and all the issues related to physics of the emission [J79], [J84]. In particular, he focused on the use of CTR as a powerful tool to investigate the longitudinal profile of an electron bunch [J83].
ODRI (Optical Diffraction Radiation Interference)	High brightness and high repetition rate beams can severely damage or destroy Intercepting diagnostics. For such beams, the diffraction radiation (DR) is a good candidate. The particle goes through a hole in a metallic screen, while the co-propagating electric field interacts with the material around the hole. The analysis of the angular distribution of the radiation reveals important details about beam transverse phase space. AC has been the principal investigator of two experiments, in collaboration between INFN and DESY, that successfully measured first the beam size [J51] and later also the emittance [J27] without intercepting or disturbing the beam. Other groups are now interested in this diagnostics and they are implementing it in their project.
Compact neutron source	The quality of the LPA beams are not yet satisfactory for many applications. However, a neutron source can accept quite a wide range of energy spread and pointing instability in the primary beam because in any case the neutrons must be later moderate. A laser based neutron source can be very compact and can be easily hosted in Industries, universities, and small labs. The flux could be comparable with some of the so-called CANS (Compact Accelerator Neutron Source). A wide range of applications can be foreseen, from PGAA (Prompt Gamma Activation Analysis) to image radiography among the others, in different field, as for instance industrial material tests, cultural heritage, detector R&D. An effort to establish a wide collaboration has been very recently started, called ALADIN (Applications of Laser-Driven ions and Neutrons), connecting people of 10 institution worldwide. AC is studying the possibility to perform experiments at the SPARC_LAB high intensity laser, FLAME.
UHV cathodic arc deposition	AC worked on this topic as a young researcher. The main idea was to use the cathodic arc discharge in UHV (Ultra High Vacuum) to deposit a thin niobium film on a copper cavity substrate. Niobium has poor mechanical quality at liquid helium temperature. Using copper as a substrate can alleviate this problem. The main difficulty was to have a discharge in UHV, the only environment that can guarantee a high quality niobium film deposition [J78], [J76], [74]. AC focused on several aspects of this experiment in particular on recognizing and filtering macroparticles that can leave the cathode and once deposited on the sample can softener the structure [J71]. The experiment, funded both by EU in FP6 and INFN, successfully deposited and measured one cavity cell [J70], [J69].

List of peer reviewed papers on international Journals (total number 84)

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CURRICULUM VITAE

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Titoli di studio e contratti lavorativi:

- Diploma di Maturità Classica conseguito nel 1989
- Diploma di Laurea in Fisica conseguito il 30 Maggio 1996, presso l'Università degli Studi di Roma "La Sapienza", con votazione 110/110, Titolo della tesi: "Studio di un prototipo di rivelatore optoelettronico basato su un dispositivo Electron Bombarded CCD e relativa acquisizione."
- Titolo di Dottore di Ricerca in Fisica conseguito il 21 Febbraio 2000, presso l'Università degli studi di Roma "Tor Vergata", Titolo della tesi: "RPCs as ATLAS Trigger detectors at LHC."
- Assegno di ricerca aggiuntivo di durata semestrale per la collaborazione ad attività di ricerca da svolgersi presso il Dipartimento di Fisica dell' Università degli Studi di Roma "Tor Vergata", relativo al programma di ricerca: "La Camera ad Elettrodi Piani Resistivi(RPC): un nuovo rivelatore a gas per la fisica dei muoni ad LHC." (settori disciplinari B01A-B04X, tutore Prof. Rinaldo Santonico). L'assegno semestrale vinto nel Maggio del 2000, in una selezione pubblica per titoli integrata da un colloquio, è stato rinnovato per la massima durata consentita fino a Giugno del 2001.
- Assegno di ricerca aggiuntivo di durata semestrale per la collaborazione ad attività di ricerca da svolgersi presso il Dipartimento di Fisica dell' Università degli Studi di Roma "Tor Vergata", - relativo al programma di ricerca: "Progetto, realizzazione e test

di circuiti elettronici di Front-End per rivelatori veloci di ionizzazione da impiegare nella fisica di particelle." (settori disciplinari B01A-B04X, tutore Prof. Rinaldo Santonico). L'assegno semestrale vinto nel Gennaio del 2002, in una selezione pubblica per titoli integrata da un colloquio, è stato rinnovato per la massima durata consentita fino a Dicembre del 2002.

- Contratto di collaborazione didattica per il corso di Fisica Sperimentale, per il Corso di Laurea Breve in "Scienze dei Media e della Comunicazione", presso Dipartimento di Matematica della Facoltà di Scienze Matematiche, Fisiche e Naturali dell'Università di Roma "Tor Vergata". La collaborazione iniziata nell'anno accademico 2002-2003, si è ripetuta nell'anno accademico 2003-2004.
- Assegno di ricerca di durata biennale per la collaborazione ad attività di ricerca da svolgersi presso il Dipartimento di Fisica dell' Università degli Studi di Roma "Tor Vergata", relativo al programma di ricerca: "Sviluppo di strumentazione elettronica per rivelatori di particelle ad alta risoluzione temporale." (settori disciplinari FIS/01 e FIS/04, tutore Prof. Rinaldo Santonico). L'assegno è stato vinto nell'Ottobre del 2003, in una selezione pubblica per titoli integrata da un colloquio.
- Contratto di lavoro con profilo professionale di ricercatore, ai sensi dell'art.23 legge 70/75, presso la Sezione "Tor Vergata" dell'INFN. Il contratto, iniziato nel Dicembre 2005, è stato prolungato fino a Marzo 2009.
- Contratto di collaborazione coordinata e continuativa per lo svolgimento di attività di tutoraggio sul corso di Fisica Generale SSD FIS/01 per l'a.a. 2008/2009 della Facoltà di Ingegneria dell'Università di Roma "La Sapienza" .
- Contratto di lavoro con profilo professionale di ricercatore, ai sensi dell'art.23 legge 70/75, presso la Sezione "Tor Vergata" dell'INFN. Il contratto, iniziato nell'Aprile 2009, è stato prolungato fino a Febbraio 2010.
- Contratto di lavoro con profilo professionale di ricercatore, ai sensi dell'art.23 legge 70/75, presso la Sezione "Tor Vergata" dell'INFN.

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- Contratto di lavoro a tempo indeterminato con profilo professionale di ricercatore dal Giugno del 2011, presso la Sezione di Trieste dell'INFN. Nel Novembre del 2015 ottiene il trasferimento presso la sezione INFN di "Tor Vergata" dove attualmente presta servizio.

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1989 - 1996 Studentessa di Fisica all'Università di Roma "La Sapienza", indirizzo nucleare. Il lavoro di tesi di laurea si svolge nell'ambito dell'esperimento ACTAR, Gruppo V INFN, su rivelatori di particelle traccianti ad alta risoluzione spaziale. Il rivelatore è costituito da capillari di vetro riempiti di liquido scintillante, letti da una catena optoelettronica composta da un dispositivo ad accoppiamento di carica, CCD o EBCCD (Electron Bombarded CCD), preceduto da una catena di intensificatori di immagine.

11/'96 → 11/'99 Dottoranda in Fisica all' Università di Roma "Tor Vergata".

Il lavoro di ricerca per la tesi di dottorato si svolge in collaborazione con il gruppo ATLAS guidato dal Prof. R. Santonico. Il gruppo lavora sui rivelatori RPC (Resistive Plate Chamber) basati sulla ionizzazione in mezzo gassoso. Per le loro caratteristiche di alta risoluzione temporale ($\leq$ 1.5 ns) e di alta capacità di conteggio in regime di "valanga" ($\sim$ 1 kHz/cm^2), gli RPC costituiranno una parte del trigger per muoni dell'esperimento ATLAS, ad LHC (CERN). La sottoscritta ha lavorato sulla messa a punto della miscela di gas da utilizzare nell'esperimento ATLAS e sui test dei primi prototipi ATLAS di grandi dimensioni,con raggi cosmici e su testbeam sotto irraggiamento.

5/2000 → 5/2002 Durante questo periodo, come assegnista all'interno dello stesso gruppo di ricerca, si è occupata dell' elettronica di Front-End dei rivelatori RPC, che nel regime di valanga è stata radicalmente

modificata rispetto al precedente regime di streamer. Ha curato il progetto e la realizzazione di un sistema di test per le schede dell'intera produzione dell'esperimento ATLAS e dell'esperimento ARGO. Ha inoltre condotto e analizzato le misure su un campione di oltre 30.000 canali, estraendo significativi risultati statistici.

5/2002 → 11/2002 Durante questo periodo, ha partecipato al primo test su fascio condotto al CERN nell'area di test X5, dedicato allo studio dell' efficienza di trigger e del potere di reiezione del fondo a bassa energia, nella configurazione geometrica disegnata per lo spettrometro di muoni di ATLAS. Ha continuato a partecipare ai test ad X5, sui rivelatori standard di produzione, fino alla loro conclusione alla fine del 2004.

10/2003 → 5/2004 Durante questo periodo, ha contribuito a definire uno schema di cablaggio per gli RPC, ha partecipato presso i Laboratori Nazionali di Frascati, ai test dedicati all'assemblaggio con i rivelatori MDT, al fine di formare le stazioni moduli elementari del sistema di Trigger dell'esperimento ATLAS. Ha partecipato agli assemblaggi presso il sito sperimentale BB5 del CERN, contribuendo significativamente alla definizione delle procedure di cablaggio e al controllo di qualità dei moduli stessi fino al Febbraio del 2005.

10/2004 → 7/2006 Durante questo periodo ha curato lo sviluppo di una torre di test con raggi cosmici, presso i laboratori dell'INFN della Sezione Roma-Tor Vergata. Il test è dedicato al controllo funzionale e alla verifica delle prestazioni degli RPC "BOL" di ATLAS, che sono i moduli di massima dimensione nel Barrel Trigger (circa 2,5 x 5,0 m^2). Il sistema è caratterizzato da un altissimo numero di canali di lettura (circa 4400).Ha affrontato problemi di automatizzazione per ottimizzare i tempi della presa dati, la qualità scientifica e la completezza dei dati raccolti. Ha condotto come responsabile il test sulle prime 150 unità RPC BOL e dopo la riapertura e la riparazione delle unità difettose, ha concluso il test di qualità di tutte le unità RPC BOL dell'esperimento ATLAS.

9/2006 → 3/2009 Durante questo periodo, ha partecipato al commissioning dell'esperimento ATLAS.

3/2009 → 11/2009	Durante questo periodo, ha curato la messa in opera di un test con raggi cosmici presso i laboratori della Sezione "Tor Vergata" dell'INFN, dedicato allo studio sistematico di prototipi RPC di piccole dimensioni con diversi spessori del volume sensibile, equipaggiati con una elettronica innovativa. Il test è inserito in un progetto più ampio per aumentare le prestazioni del rivelatore ad elevate rate di conteggio (> 1 kHz/cm^2), mantenendo inalterate le proprietà di risoluzione temporale ed efficienza.
12/2009 → 4/2010	Barbara Liberti usufruisce del congedo parentale obbligatorio e facoltativo per la maternità.
5/2010 → 5/2011	Durante questo periodo, prosegue lo sviluppo del test con raggi cosmici presso i laboratori della Sezione "Tor Vergata" dell'INFN, sviluppa codice di analisi e prosegue nell'attivitá di R&D.
6/2011 → 9/2011	L'attività di Barbara Liberti si è svolta presso i laboratori dell'INFN di Trieste, collaborando con il gruppo che progetta, sviluppa e testa un rivelatore a microstrip di silicio, ad alta resistività e doppio strato. Il detector era candidato a costituire il layer 0 del tracciatore di vertice al silicio dell'esperimento SuperB (SVT).
10/2011 → 6/2012	L'attività di Barbara Liberti si è svolta presso i laboratori dell'INFN della sezione TorVergata nell'ambito dell' esperimento ATLAS. Ha condotto la costruzione ed il test in laboratorio di diversi prototipi di RPC che potevano candidarsi a soddisfare le richieste per l'upgrade del rivelatore di trigger dell'end-cap dell'esperimento ATLAS (progetto NSW ATLAS). I prototipi testati sono caratterizzati da gap di gas sottili ed equipaggiati con una innovativa elettronica di Front-End che aumenta la sensitività e diminuisce il rapporto segnale rumore permettendo di lavorare a campi e dunque a cariche per conteggio più basse di un ordine di grandezza, aumentando la rate capability a parità di invecchiamento.
7/2012 → 1/2013	Barbara Liberti usufruisce del congedo parentale obbligatorio e facoltativo per la maternità.
2/2013 → 9/2013	L'attività di Barbara Liberti si è incentrata sullo studio delle prestazioni e del data quality delle camere di trigger RPC dell'esperimento ATLAS. I dati ad alta statistica sono estratti dal secondo livello di trigger di ATLAS. Un flusso di dati dedicato (calibration

stream) presso diversi centri Tier2 di ATLAS viene processato ed analizzato run per run. L'obiettivo dell'analisi è la produzione di plot significativi ed indicativi del comportamento dell'intero detector per il data quality: identificazione automatica di problematiche connesse all' elettronica, conteggio e localizzazione dei canali morti, identificazione automatica di problematiche connesse alla bassa e all'alta tensione, efficienza e cluster size medie per pannello. Ma anche lo studio dell'evoluzione nel tempo dei parametri fondamentali del funzionamento del detector e dell'ageing con tomografie bidimensionali delle inefficienze delle gap di gas con risoluzione al cm.

10/2013 → 5/2016 L'attività di Barbara Liberti, nell'ambito di un R&D dell'INFN "ATLAS/CMS RPC per Fase 2", si è incentrata sullo studio delle prestazioni degli RPC con nuove miscele di gas. La miscela di gas é sempre stato un elemento cruciale per il buon funzionamento del detector. La miscela cosidetta "Standard", composta del 96.5% di TetraFluorEtano, del 4.5% di Isobutano e del 5 per mille di SF6, ha consentito fin ad ora di lavorare in un vasto intervallo di tensione con un efficienza di $\sim 99\%$ in regime di valanga con la totale assenza di streamer. Tuttavia questa miscela presenta il problema di avere un elevato Global Warming Power (GWP) di ~ 1500 (essendo il GWP del TFE 1430 e dell'SF6 23900). Il limite internazionale imposto GWP ≤ 150 rende quindi necessario trovare un gas che sostituisca a paritá di prestazioni la miscela standard ma che abbia un GWP pi basso. Per i sistemi giá costruiti i limiti per le prestazioni in amplificazione primaria ed altre peculiaritá della miscela sono decisamente stringenti, per possibili sistemi futuri lo spettro delle possibilitá é decisamente piú ampio. In ogni caso la definizione di nuove miscele necessita non solo un approfondito studio sulle prestazioni del detector ed i parametri caratteristici della miscela, ma anche un accurato studio sull'invecchiamento del detector e sulle prestazioni ad alta rate. Uno dei candidati studiati e' il Tetrafluoropropilene, HFO1234-ze, con un GWP=6. Il gas studiato ha dato fino ad ora risultati interessanti e promettenti.

Elenco delle pubblicazioni selezionate di Barbara Liberti

1. **"Improving the RPC rate capability"**
   G. Aielli and P. Camarri and R. Cardarelli and A. Di Ciaccio and L. Di Stante and R. Iuppa and B. Liberti and L. Paolozzi and E. Pastori and R. Santonico and M. Toppi.
   JINST **11**, no. 07, P07014 (2016).

2. **"Performance of RPCs with phenolic glass electrodes"**
   G. Aielli and P. Camarri and R. Cardarelli and A. Di Ciaccio and L. Di Stante and B. Liberti and E. Pastori and R. Santonico.
   JINST **11**, no. 10, C10009 (2016).

3. **"RPC based 5D tracking concept for high multiplicity tracking trigger"**
   G. Aielli and P. Camarri and R. Cardarelli and A. Di Ciaccio and L. Distante and B. Liberti and L. Paolozzi and E. Pastori and R. Santonico.
   JINST **12**, no. 01, C01057 (2017).

4. **"Further gas mixtures with low environment impact"**
   B. Liberti and G. Aielli and P. Camarri and R. Cardarelli and A. Di Ciaccio and L. Di Stante and E. Pastori and and R. Santonico.
   JINST **11**, no. 09, C09012 (2016).

5. **"The RPC space resolution with the charge centroid method"**
   G. Aielli, R. Cardarelli, L. D. Stante, B. Liberti, L. Paolozzi, E. Pastori and R. Santonico.
   10.1088/1748-0221/9/09/C09030
   JINST **9**, no. 09, C09030 (2014).

6. **"Performance of the ATLAS muon trigger in pp collisions at $\sqrt{s} = 8$ TeV"**
   G. Aad *et al.* [ATLAS Collaboration].
   arXiv:1408.3179 [hep-ex]
   10.1140/epjc/s10052-015-3325-9
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7. **"New RPC gas mixtures for large area apparatuses"**
   R. Cardarelli, L. D. Stante, B. Liberti, L. Paolozzi, E. Pastori and R. Santonico.
   10.1088/1748-0221/9/11/C11003
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   G. Aad *et al.* [ATLAS Collaboration].
   arXiv:1311.7070 [physics.ins-det]
   10.1088/1748-0221/9/02/P02001
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   G. Aad *et al.* [ATLAS Collaboration].
   arXiv:1207.7214 [hep-ex]
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   Phys. Lett. B **716**, 1 (2012)

10. **"High rate fast precision tracking trigger with RPCs"**
R. Cardarelli *et al.*.
PoS RPC **2012**, 069 (2012).

11. **"Performance of RPCs and diamond detectors using a new very fast low noise preamplifier"**
R. Cardarelli *et al.*.
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JINST **8**, P01003 (2013).

12. **"RPC performance vs. front-end electronics"**
R. Cardarelli *et al.*.
10.1016/j.nima.2010.09.136
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13. **"Performance of the ATLAS Trigger System in 2010"**
G. Aad *et al.* [ATLAS Collaboration].
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20. G. Aielli et al. (ARGO-YBJ Collaboration), *Software timing calibration of the ARGO-YBJ detector*, Astroparticle Physics, Volume 30, Issue 6, January 2009, Pages 287-292.

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