INFORMAZIONI PERSONALI

Barbara Caiffi

Attività di ricerca

10/2019 – Oggi **Ricercatore a tempo indeterminato presso INFN- sezione di Genova**

Progetto **Hi-Luminosity**

Attività principali **Progettazione e caratterizzazione di magneti superconduttori per acceleratori.**

Sono coinvolta nella costruzione del dipolo di separazione/ricombinazione D2 (MBRD) per l'upgrade High Luminosity dell'acceleratore LHC (HL-LHC). Alla costruzione del modello corto sta seguendo la costruzione di un prototipo a dimensioni reali e quindi una serie di 6 magneti, che verranno installati nel tunnel del CERN nel 2025. Mi sono occupata della progettazione meccanica e magnetica di tali dipoli e ne sto seguendo la costruzione presso l'azienda ASG Superconductors di Genova. Inoltre, mi occupo della loro strumentazione, caratterizzazione e delle misure dei parametri più rilevanti, tra cui la qualità di campo. Svolgo queste attività in collaborazione con il dipartimento "Magnet, Superconductors and Cryostats Technology" del CERN, con cui sono l'interfaccia e la responsabile per tutte le attività che riguardano il controllo qualità e il layout magnetico.

Progetto **KM3NeT**

Attività principali **Studio di sorgenti astrofisiche con il telescopio per neutrini KM3NeT**

KM3NeT è un'infrastruttura di ricerca localizzata nelle profondità del mar Mediterraneo, per la rivelazione di neutrini. Due blocchi di array di scintillatori saranno posizionati rispettivamente al largo di Tolone (ORCA, Oscillation Research with Cosmics in the Abyss) e di Capo Passero (ARCA, Astroparticle Research with Cosmics in the Abyss), il primo ottimizzato per l'osservazione di neutrini atmosferici per studi di oscillazione e gerarchia di massa, il secondo ottimizzato per neutrini cosmici per lo studio di sorgenti astrofisiche, quali SNR e PWN. Nell'ambito di tale progetto mi occupo soprattutto dello studio di sensibilità di ARCA a sorgenti astrofisiche e dello sviluppo dei software necessari per tali tipologie di analisi.

02/2019 –09/2029 **Ricercatore a tempo indeterminato presso il Centro Ricerche di Frascati dell'ENEA, nel dipartimento di Tecnologie per la Fusione**

Progetto **DTT (Divertor Tokamak Test)**

Attività principali DTT è un progetto che prevede la costruzione di un reattore a fusione termonucleare per lo studio del componente divertore, di fondamentale importanza per la stabilità del plasma e particolarmente critico in quanto soggetto a ingenti stress termici e meccanici. All'interno di tale progetto mi sono occupata di analisi nucleari, volte soprattutto alla progettazione di diagnostiche neutroniche necessarie per la caratterizzazione degli scenari di plasma.

05/2017 - 05/2019 **Tecnologo a tempo determinato presso INFN, sezione di Genova**

05/2016 –05/2017 **Assegno di ricerca tecnologica presso INFN, sezione di Genova**

Progetto **Progettazione e caratterizzazione di magneti superconduttori per acceleratori.**

Attività principali Ho lavorato nel laboratorio di superconduttività applicata, in cui mi sono occupata dello studio di magneti superconduttori per acceleratori. In particolare, ho seguito la progettazione, caratterizzazione e follow-up industrial della costruzione del dipolo superconduttore di separazione/ricombinazione D2 (MBRD) per l'upgrade Hi-Luminosity dell'acceleratore LHC del CERN. Inoltre, mi sono anche occupata della progettazione e dello studio di fattibilità di un dipolo in Nb_3Sn ad alto campo (16T) per un possibile acceleratore post-LHC. Tale attività è stata svolta all'interno del progetto EuroCircol-FCC e ha portato al finanziamento della costruzione di un modello corto da 12T.

06/2015-09/2015 **Ricercatore (consulente) presso il centro Ricerche di Frascati dell'ENEA, Dipartimento Tecnologie per la Fusione**

Progetto **ITER – DEMO**

Attivita' principali Nell'ambito del progetto europeo EUROFusion mi sono occupata di problematiche di neutronica e shielding per il reattore a fusione DEMO, dell'ottimizzazione del suo design e della caratterizzazione dei suoi campi di radiazione (neutroni e γ).

01/2012 – 03/2015 **Dottorato di Ricerca in Fisica presso l'Universita' degli Studi di Genova**

Attivita' principali

Il mio lavoro di dottorato è stato svolto in collaborazione con il laboratorio di fusione termonucleare ITER e ha riguardato lo studio dello shielding neutronico e delle diagnostiche per neutroni per il reattore che tale laboratorio sta costruendo. In particolare, mi sono occupata dello studio della dose occupazionale nella regione chiamata TBM Port Cell per verificare l'adeguatezza del design degli shielding proposti per schermare l'ingente flusso neutronico che ITER produrrà (fino a 10^{14} neutroni/cm^2s da 14 MeV).

In parallelo, ho lavorato sullo sviluppo di un rivelatore per neutroni basato sulla tecnologia dei diamanti artificiali di tipo CVD, ottimizzato per l'energia di 14 MeV (pari a quella dei neutroni prodotti dalla fusione di deuterio e trizio) in grado di sopportare forti campi di radiazione. Il prototipo di tale rivelatore è stato testato al generatore di neutroni dell'ENEA di Frascati. Inoltre, durante il mio dottorato ho svolto attività di ricerca presso il laboratorio di fusione termonucleare JET (Culham, UK), grazie a un grant dell'ambasciata Italiana a Londra. La mia attività è stata l'analisi dati dei rivelatori al diamante per il monitoraggio della radiazione UV and X-Ray proveniente dal plasma di fusione termonucleare

ISTRUZIONE

02/01/2012 – 06/03/2015 **Dottorato di Ricerca in Fisica**

Università degli studi di Genova

Tesi: " Neutron shielding and diagnostics in tokamaks"

Relatori: Prof. Mauro Taiuti, Mikhail Osipenko

Shutdown dose rate evaluation in the TBM Port #16 of ITER. Nuclear analysis focused on neutronics transport calculation, activation evaluation with FISPACT and shutdown dose rate calculation with R2S (Rigorous 2 Steps) approach.

Development and characterization of a neutron spectrometer in proton recoil telescope configuration based on the CVD diamond technology optimized for 1-14 MeV energy range.

01/09/2009 – 27/10/2011 **Corso di Laurea specialistica if Fisica Nucleare**

Università degli Studi di Genova

Tesi: "Feasibility study of the measurement of the transition weak form factor N-Λ "

Relatori: Prof. Mauro Taiuti, Mikhail Osipenko

Voto 110/110 cum laude

01/09/20016 – 13/10/2009 **Corso di laurea triennale in Fisica Generale**

Università degli studi di Genova

Tesi: "DNA melting: the zip model "

Relatore: Prof. Ugo Valbusa

Voto 110/110

ALLEGATI

1. Lista Conferenze e Workshops
2. Lista Pubblicazioni
3. Lista Technical Reports

Genova, 20/03/2021

Barbara Caiffi

Lista Conferenze e Workshops

- ASC2020, 24 October- 7 November 2020, virtual. Poster presentation “The Development of the Superconducting Dipoles D2 for the High Luminosity Upgrande of LHC”. Proceedings published in IEEE Transactions on Applied Superconductivity, (2021), DOI: 10.1109/TASC.2021.3057561
- ISFNT-14, 22-27 September 2019, Budapest, Hungary. Poster presentation “ Nuclear Analysis in support of the conceptual design of the DTT Tokamak Neutron Diagnostics”. Proceedings published in Fusion Engineering and Design (2020), DOI: 10.1016/j.fusengdes.2020.111629
- FCC Week 2018, 9-13 April 2018, Amsterdam, the Netherlands. Oral presentation “ Cosθ option for FCC”
- EUCAS 2017, 17-21 September 2017, Geneve, Switzerland. Oral presentation “Update on Mechanical Design of a cosθ 16 T benging dipole for the Future Circular Collider (FCC) ” Proceedings published in IEEE Transactions on Applied Superconductivity, (2018), 10.1109/TASC.2018.2805918
- FCC Week 2017, 29 May- 2 June 2017, Berlin, Germany. Oral presentation “Mechanical design of the cosθ option”.
- EuroCirCol Collaboration meeting, 7-9 November 2016, ALBA Synchrotron, Spain. Oral presentation “Cos-theta design”.
- 100° Congresso Nazionale SIF (Società Italiana di Fisica), 22-26 September 2014, Pisa (Italy), Invated Talk “Analisi di attivazione nelle porte sperimentali di ITER.” (Activation analysis in the ITER experimental ports)
- IX ITER Neutronic Meeting, 24-27 June 2014, Frascati –poster “Preliminary Results of Shutdown Dose Rate in TBM Port #16
- Workshop “'INFN-Energia e Industria verso Horizon 2020 e nuovi mercati”, Genoa 15-16 January 2014- Oral presentation
- 3rd International Conference Frontiers in Diagnostic Technologies, 25-27 November 2013, Frascati (Italy) – Poster “Analysis of UV and soft X-Ray diagnostic data from CVD Diamond Detectors on the JET Tokamak ” – Proceedings published in Physics Procedia (2015), pp. 79-83 DOI: 10.1016/j.phpro.2015.02.014
- CLAS12 Collaboration Meeting, 12-15 October 2011, Thomas Jefferson Newport News (VA). Oral presentation “Feasibility study of the measurement of the transition weak form factor N-Λ”

Lista Pubblicazioni

1. A. Bersani, et all, “A Solenoid with Partial Yoke for the Dune Near Detector”, IEEE Transactions on Applied Superconductivity, IEEE Transactions on Applied Superconductivity PP(99):1-1, (2021), DOI: 10.1109/TASC.2021.3063068
2. B.Caiffi et al.,”The Development of the Superconducting Dipoles D2 for the High Luminosity Upgrade of LHC”, IEEE Transactions on Applied Superconductivity PP(99):1-1, (2021), DOI: 10.1109/TASC.2021.3057561
3. S.Aiello et al. (KM3NeT collaboration), “Architecture and performance of the KM3NeT font-end firmware”, Journal of Astronomical Telescopes Instruments and Systems 7(01) (2021) , DOI:10.1117 10.1117/1.JATIS.7.1.016001
4. E.Todesco et. al “The High Luminosity LHC interaction region magnets towards series production” , Superconductor Science and Technology (2021), DOI: 10.1088/1361-6668/abdba4
5. S.Aiello et al. (KM3NeT collaboration), “Deep-sea deployment of the KM3NeT neutrino telescope detection units by self-unrolling”, Journal of Instrumentation 15(11) (2020), DOI: 10.1088/1748-0221/15/11/P11027
6. S. Aiello et al. (KM3NeT collaboration), “Event reconstruction for KM3NeT/ORCA using convolutional neural networks”, Journal of Instrumentation 15(10) (2020), DOI: 10.1088/1748-0221/15/10/P10005
7. B.Caiffi et al., “Neutronic analyses in support of the conceptual design of the DTT tokamak radial neutron camera”, Fusion Engineering and Design 157(5–14) (2020), DOI: 10.1016/j.fusengdes.2020.111629
8. D. Flammini et al., “Pre-analysis of the WCLL breeding blanket mock-up neutronics experiment at the Frascati Neutron Generator”, Fusion Engineering and Design 156:111600(2020) DOI: 10.1016/j.fusengdes.2020.111600
9. R.Villari et al.,” Nuclear design of Divertor Tokamak Test (DTT) facility”, Fusion Engineering and Design 155:111551 (2020), DOI: 10.1016/j.fusengdes.2020.111551
10. A. Foussat et al., “The HL-LHC D2 Short model recombination dipole cold test results and analysis”, IEEE Transactions on Applied Superconductivity PP(99):1-1 (2020), DOI: 10.1109/TASC.2020.2976963
11. M. Prioli et al., “The CLIQ quench protection system applied to the 16 T FCC-hh dipole magnets”, IEEE Transactions on Applied Superconductivity PP(99):1-1 (2019), DOI: 10.1109/TASC.2019.2930705
12. A. Abada et al., “FCC Physics Opportunities: Future Circular Collider Conceptual Design Report Volume 1”, Eur.Phys.J. C79 (2019) no.6, 474, DOI:10.1140/epjc/s10052-019-6904-3.
13. A. Abada et al., “FCC-ee: The Lepton Collider: Future Circular Collider Conceptual Design Report Volume 2.”, Eur.Phys.J.ST 228 (2019) no.2, 261-623, DOI: 10.1140/epjst/e2019-900045-4

14. A. Abada et al., “FCC-hh: The Hadron Collider: Future Circular Collider Conceptual Design Report Volume 3”, Eur.Phys.J.ST 228 (2019) no.4, 755-1107, DOI: 10.1140/epjst/e2019-900087-0
15. A. Abada et al., “HE-LHC: The High-Energy Large Hadron Collider”, Eur.Phys.J.ST 228 (2019) no.5, 1109-1382, DOI: 10.1140/epjst/e2019-900088-6
16. R. Valente et al., “Baseline Design of a 16 T cos Bending Dipole for the Future Circular Collider”, IEEE Transactions on Applied Superconductivity PP(99):1-1 (2019), DOI: 10.1109/TASC.2019.2901604
17. A. Bersani, et al., “The Superconducting Separation Dipoles D2 for the High Luminosity Upgrade of LHC: From Short Model to Prototype”, IEEE Transactions on Applied Superconductivity, (2019), DOI:10.1109/TASC.2019. 2900598
18. D. Shoerling et al. “The 16 T dipole development program for FCC and HE-LHC”, IEEE Transactions on Applied Superconductivity, (2019), DOI:10.1109/TASC.2019.2900556
19. J. Zhao, et al., “Mechanical stress analysis during a quench in CLIQ protected 16 T dipole magnets designed for the Future Circular Collider” Physica C (Superconductivity and its Applications), DOI:10.1016/j.physc.2018.04.003
20. V. Marinozzi, et al. “Conceptual Design of a 16 T cos θ Bending Dipole for the Future Circular Collider”, IEEE Transactions on Applied Superconductivity, (2018), DOI:10.1109/TASC.2018.2795533
21. B. Caiffi, et al. “Update on mechanical design of a cosθ 16-T bending dipole for the future circular collider”, IEEE Transactions on Applied Superconductivity (2018) DOI:10.1109/TASC.2018.2805918
22. D. Tommasini, et al. “Status of the 16 T Dipole Development Program for a Future Hadron Collider”, IEEE Transactions on Applied Superconductivity (2017) DOI:10.1109/TASC.2017.2780045
23. P. Fabbricatore, et al., “Development of a Short Model of the Superconducting Separation Dipoles D2 for the High Luminosity Upgrade of LHC”, IEEE Transactions on Applied Superconductivity (2017) DOI:10.1109/TASC.2017.2772779
24. V. Marinozzi, et al. “Quench Protection Study of the Eurocircol 16 T Cosθ Dipole for the Future Circular Collider (FCC)” IEEE Transactions on Applied Superconductivity (2017) DOI: 10.1109/TASC.2017.2656156
25. M. Sorbi et al., “The EuroCirCol 16T Cosine-Theta Dipole Option for the FCC“ IEEE Transactions on Applied Superconductivity (2016) DOI: 10.1109/TASC.2016.2642982
26. B. Caiffi et al. “Proton recoil telescope based on diamond detectors for measurement of fusion neutrons” , TNS IEEE Transactions on Nuclear Science, (2016) DOI: 10.1109/TNS.2016.2572225.
27. M. Osipenko et al., "Response of diamond detector sandwich to 14 MeV neutrons", Nuclear Inst. and Methods in Physics Research, A 817 (2016), pp. 19-25 DOI: 10.1016/j.nima.2016.02.008
28. B.Caiffi et al. “Analysis of the response of CVD Diamond Detectors for UV and sX-Ray plasma diagnostics installed at JET”, Physics Procedia (2015), pp. 79-83 DOI: 10.1016/j.phpro.2015.02.014
29. D.Scarfò et al. “A Preliminary Assessment of the Transmutation Potentialities for an ITER-like FW Sector Loaded with MA“, Global Journal of Energy Technology Research Updates (2015), DOI: 10.15377/2409-5818.2015.02.02.4
30. M.Osipenko et al., “Neutron spectrometer for fast nuclear reactors”, Nuclear Inst. and Methods in Physics Research, A 799 (2015), pp. 207-213 DOI: 10.1016/j.nima.2015.07.050
31. S.Fegan et al. “Assessing the performance of SICCAS-type PbWO 4 scintillators for use in EM calorimetry in the CLAS12Forward Tagger at Jefferson Lab”, Nuclear Inst. And Methods in PhysicsResearch789(2015) Pages 101–108 DOI:10.1016/j.nima.2015.03.073
32. M.Osipenko et al. “Single Crystal Diamonds for Neutrons”, EPJ PLUS 129(12) (2014) DOI: 10.1140/epjp/i2014-14268-x
33. B. Caiffi et al. “Characterisation of scCVD diamond detectors with γ sources”, Nuclear Inst. And Methods in Physics Research, A 754C (2014), pp. 24-27, DOI:10.1016/j.nima.2014.03.061

Lista Technical Reports

1. B. Caiffi et al., “Dose Rate Analysis for TBM Port #16 after Shutdown" ITER internal report, ITER_D_QZUA22 (2015)
2. B. Caiffi et al. , “Final report of pmi-3.3-t002 neutron streaming assessment in upper port”, Deliverable ID PMI-3.3-T002” (2015) EFDA_D_2M6K4T.
3. B. Caiffi et al. Final Report on Deliverable PMI.5.3-04 “Neutron shielding study of the DEMO upper vertical port” (2014) EFDA_D_2APSUF
4. Preprint INFN-13-17/GE M.Osipenko, B. Caiffi et al. , “Comparison of Fast Amplifiers for Diamond Detectors” (2013) airXiv:1310.1000

Curriculum di Paolo Saracco

Laurea in Fisica nel 1981 presso Univeritá di Genova.

Dottorato di Ricerca in Fisica - I ciclo - 1987 presso Universitá di Genova

Borsa post-doc INFN dal settembre 1987 al giugno 1988

Ricercatore INFN dal 1 giugno 1988

La mia attivitá é divisa in due periodi, prima del marzo 1997 e successivamente al dicembre 2006. Tra il marzo 1997 ed il dicembre 2006 ho svolto attivitá diverse da quelle di ricerca (i riferimenti sono all'elenco completo delle pubblicazioni),

Nel primo periodo, dalla tesi di laurea in avanti e fino al marzo 1997 , mi sono occupato prevalentemente di meccanica quantistica dei sistemi a molti corpi e di fisica nucleare teorica in collaborazione prevalente con R. Cenni, G. Dillon e con colleghi dell'Universitá di Torino.

Il contesto di riferimento vedeva lo sviluppo, in parallelo alla fisica delle alte energie, di una consistente attivitá sperimentale di fisica ad energie cosidette intermedie (tra i 100 ed i 400 MeV) utilizzando sonde sia elettromagnetiche sia adroniche su bersagli nucleari.

Lo scopo della attivitá era allora di realizzare un modello del comportamente a basse energie delle interazioni forti tra nucleoni utilizzando lo scambio dinamico di mesoni come suoi mediatori. Tale idea originava da diverse considerazioni basate sulla fenomenologia della QCD a basse energie e sul successo della rappresentazione dell'interazione NN per mezzo del potenziale di Bonn, fenomenologicamente ottenuto in termini di scambio di fittizi mesoni statici: la descrizione della fisica del nucleo in termini di potenziali statici naturalmente perde capacitá descrittiva al crescere della scala delle energie e degli impulsi.

La scelta naturale fu quella di costruire una teoria effettiva comprendente esplicitamente quei gradi di libertá che man mano risultavano necessari, a partire naturalmente dai nucleoni. Il pione assume in tale contesto un ruolo rilevante essendo il mesone di massa minore e quindi mediatore di interazione a distanze maggiori: il comportamento dinamico del pione diviene per primo significativo alle energie intermedie, Il problema principale, trattandosi di interazioni forti, fu quello di sviluppare una metodologia di calcolo affidabile, basata su un criterio di scelta non arbitrario dei contibuti che era necessario includere e su quali era possibile invece trascurare o approssimare fenomenologicamente (ad esempio per mezzo di parametri di Migdal-Landau) [1-9,11,13-18,20,22,24,25-28]

Per fare questo venne sviluppato da me e da R. Cenni un modello di teoria campo efficace (regolata ad alte energie/impulsi da un cutoff fisico) di nucleoni in moto non relativistico interagenti mediante lo scambio di pioni e di altri mesoni piu' pesanti: la dimostrazione della rinormalizzabilitá di un tale approccio [8] e dell'esistenza di un unico cutoff naturale nella teoria (l'impulso di Fermi) vennero dimostrati [9,18]. Tale modello, trattato con i metodi tipici del funzionale generatore, veniva bosonizzato e trattato semiclassicamente. Cio' ha fornito uno schema ragionevole di approssimazione, calcolabile in termini di classi infinite, ma esplicitamente risommabili di diagrammi di Feynmann [7,14].

Ma ancora di piú il modello era sufficientemente flessibile da consentire progressivamente l'introduzione quando necessario di ulteriori gradi di libertá fermionici (a partire dalla risonanza Δ_{33}) e mesonici ($\rho, \omega, \eta, \ldots$).

Il confronto con l'esperimento risultava semplificato qualora il nucleo bersaglio fosse sondato per mezzo di interazioni elettromagnetiche, consentendo cosií di separare il comportamento della sonda (elettroni o fotoni) da quello del mezzo nucleare. Naturalmente era utile utilizzare bersagli isospin simmetrici e relativamente "pesanti" in modo da poter trascurare gli effetti di superficie rispetto a quelli di volume, In tal modo i metodi propri della cosidetta materia nucleare infinita erano applicabili. Numerosi laboratori misurarono lo scattering quasi elastico di elettroni su diversi nuclei con le corrette caratteristiche, dall'ossigeno fino al ferro ed al piombo, fornendoci cosíun'ampia fenomenologia di riferimento.

Questo tipo di schema risultava nondimeno estremamente complesso dal punto di vista del calcolo numerico poiche' i singoli contributi (espressi tramite diagrammi di Feynmann), non godono delle proprieta' di simmetria proprie della teoria dei campi nel vuoto a causa della presenza del mezzo nucleare stesso. Quindi lo sviluppo delle metodologie di calcolo necessarie richiese diversi anni e lo sviluppo di tecniche particolari, tra cui alcuni notevoli risultati analitici in uso anche oggi in contesti differenti dalla fisica nucleare delle basse energie [9,18].

Dopo circa un decennio si riuscí a riprodurre ragionevolmente la fenomenologia dello scattering di elettroni fino ad energie ed impulsi dell'ordine di qualche centinaio di MeV: il numero di contributi inclusi nel modello superó il milione [22,26,28,35].

Gli sviluppi di tipo metodologico nel campo delle cosidette teorie di many-body portarono anche alla collaborazione con colleghi del settore della fisica dei solidi [10], ed alla stesura di un volume di meccanica quantistica dei sistemi a molti corpi [12].

A fianco di questo interesse principale ho sviluppato alcune collaborazioni in settori differenti della fisica nucleare, in collaborazione con V. Burov (JINR-Dubna) [19] e con V.Kondratyuk (ITEP-Moscow) [21,23], applicando i metodi della Reletivistic Ligth Cone Dynamics a sistemi semplici (protone, deutone).

In questo periodo ho passato diversi periodi di studio sia prosso il JINR di Dubna, sia presso l'allora CEBAF (oggi TJNAF) in Virginia.

Nel periodo 1997-2006 non mi sono occupato direttamente di ricerca scientifica, anche se ho seguito diversi aspetti di politica della ricerca, anche collaborando con l'Univeristá di Roma 1 ed il CNEL in qualitá di consulente, attivitá in parte ripresa nel 2006/2008 quando ho avuto - anche in base ad un accordo con l'INFN - il ruolo di consulente per le attiivitá di ricerca ed innovazione del Comune di Genova.

Al mio rientro in attivitá nel dicembre 2006 mi venne proposto dal management INFN di occuparmi di alcuni aspetti teorico/modellistici connessi ad un progetto allora all'inizio, oggi compiutamente configurato nel progetto strategico INFN-E. Si trattava di sviluppare i modelli per simulare il comportamento neutronico di un ADS (Accelerator Driven System), ovvero di un sistema sottocritico moltiplicante di neutroni, il cui stato stazionario sia garantito non dalla

fission chain come in un reattore convenzionale, ma da una sorgente neutronica esterna. Tale progetto prevedeva che la parte ingegneristca e termoidraulica fosse realizzata da Ansaldo Nucleare spa.

Si tratta di un settore scientificamente maturo, per il quale risultano rilevanti sia aspetti piú applicativi, sia quegli aspetti piú propriamente concettuali legati ai fondamenti fisico-matematici della teoria del trasporto di neutroni.

Lo sviluppo di un progetto di ADS [31,42,52,54,55,57,64,68] é rilevante nell'ambito della ricerca di GenIV perché si tratta di facilities intrinsecamente sicure, che possono essere quindi essere utilizzate con combustibili non convenzionali anche in quantitá significative; tuttavia esse devono essere opportunamente caratterizzate [30] e monitorate: pertanto mi sono occupato dello sviluppo di metodologie che consentono di dare una solida interpretazione agli esperimenti effettuati presso facilities sottocritiche esistenti (SCK-CEN di Mol (B), KUCA presso Kyoto Univ, (j)) [63].

In estrema sintesi il problema concettuale e pratico sta nella mancanza di una scala fisica di riferimento per determinare cosa effettivamente significhi "sistema sottocritico": é del tutto chiaro cosa sia un sistema "critico", ovvero un sistema in cui la fission chain é in grado di mantenere il sistema stazionario [30]. E' evidente che si tratta di una situazione di equilibrio (instabile, anche se controllabile grazie alla "lentezza" delle interazioni deboli"): per caratterizzare tale situazione é tradizione (iniziata da Fermi) introdurre un parametro che, modificando arbitrariamente la sorgente interna di neutroni di fissione, rende possibile (fittiziamente) la stazionarietá del sistema. Naturalmente tale parametro (indicato con k, coefficiente di moltiplicazione) vale 1 per un sistema critico, mentre é costruito essere minore di 1 per sistemi sottocritici e maggiore di 1 per sistemi sovracritici. A differenza peró della scala - ad esempio - delle temperature, per la quale esistono due punti fisici di riferimento (fusione ed ebollizione) in questo caso é disponibile solo il riferimento del sistema critico (un sistema non moltiplicante, ovvero con $k = 0$, é un secondo riferimento solo apparentemente, in quanto singolare) [30,61,62,65].

Per costruzione si tratta di un parametro adimensionale - che nella interpretazione originale di Fermi era legato al numero netto (escluse perdite ed assorbimento) di neutroni prodotti per fissione - pertanto nessuna scala é disponibile per accertare "di quanto" un sistema sia lontano dalla criticitá. Risulta quindi difficile quantificare quanto un siatema sia prossimo ad essere critico, ovvero in pratica quali sistemi di controllo debbano essere implementati. Si tratta inoltre di un paramentro non direttamente misurabile.

Da un punto di vista fenemenologico la caratterizzazione di un sistema sottocritico viene peseguita sia attraverso una opportuna riformulazione della Prony's analysis [67] che permette di dare una solida interpretazione alle misure di flusso neutronico correlandole al valore del coefficiente di moltiplicazione, sia proponendo nuove osservabili [47], specifiche per sistema veloci, di cui sia da un lato semplice la misura, dall'altro piú diretta l'interpretazione fisica.

Tale attivitá ha originato una solida collaborazione con colleghi dei Politecnici di Torino e Milano e dell'Enea che rapidamente si é anche indirizzata nella direzione di approfondire alcuni aspetti concettuali e matematici legati alla teo-

ria del trasporto lineare di neutroni [30,39,49,61-63,65-67,70]: in effetti la procedura che porta alla definizione del coefficiente di moltiplicazione é replicabile per ciascuno degli operatori presenti nell'equazione del lineare del trasporto di neutroni, dando origine a differenti moltiplicatori di Lagrange o autovalori generalizzati, il cui studio risulta parimenti interessante. Tra essi, ad esempio, l'autovalore "temporale" (α) corrispondente alle soluzioni ad evoluzione temporale esponenziale (crescente o decrescente), introdotto a suo tempo da Feynmann.

La soluzione dell'equazione lineare del trasporto é giá di per se', un problema complesso sia perché si tratta di un'equazione integrodifferenziale in 7 variabili, sia per la complicata dipendenza dei parametri (sezioni d'urto) in essa contenuti dall'energia (si pensi solamente alla zona delle risonanze nelle sezioni d'urto neutroniche): una delle possibili vie storicamnete seguite é quella di sviluppare da essa modelli piú semplici e calcolbili, ma nondimeno accurati, quali la teoria della diffusione, il rallentamento continuo, la cinetica a punto, o altri. Ció richiede la trattazione esplicita di alcuni fenomeni (o gradi di libertá) e parallelamente l'introduzione di parametri fenomenologici efficaci la cui determinazione possa essere affrontata caso per caso per descrivere la rimanente fenomenologia. Per diversi aspetti é un approccio che ha molto in comune con quanto ho fatto nella prima parte della mia attivitá: anche in questo caso si tratta di costruire modelli efficaci per descrivere un sistema complesso.

La modellizzazione completa di un sistema richiede peró anche di accoppiare la soluzione dell'equazione del trasporto perlomeno con le equazioni che descrivono la distribuzione dell'energia nel sistema (termo-idraulica) e con quelle che descrivono le modifiche isotopiche e chimico-fisiche del combustibile e degli altri materiali nel tempo (eq, di Bateman, corrosione, ecc.) [53,55,57].

L'approccio tradizonale a tale complesso problema é consistito nello sviluppo di separati strumenti di calcolo per ciascuno dei problemi citati, da utilizzare in sequenza, con gli output di un calcolo che forniscono l'input per il successivo e cosívia, eventualmente iterando fino a convergenza. A partire dagli anni 2000 l'enorme sviluppo delle possibilitá di calcolo ha fatto balenare l'opportunitá di sviluppare strumenti di simulazione integrati che affrontassero globalmente il problema. Molte nazioni hanno dedicato consistenti risorse a questo sforzo, che al momento non ha ancora prodotto risultati significativi per la sua enorme complessitá.

Una via intermedia é quella di utilizzare gli stumenti di calcolo esistenti - peraltro giá validati ed affidabili anche da un punto di ista industriale - ma automatizzandone l'uso in sequenza ed utilizzando le tecniche di HPC per aumentarne l'efficienza. A fine 2012 ho ottenuto un primo finanziamento di circa 50000 euro a valere sul POR Liguria per lo studio della qualificazione degli impianti sottocritici potenzialmente in grado di tramutare le scorie radioattive. Successivamente sono stato PI di un progetto finanziato per 180000 euro dalla Compagnia di SanPaolo sulla base di un bando competitivo a peer review per lo studio di metodologie di accoppiamento HPC tra calcoli di neutronica, di termoidraulica e potenzialmente di fuel-burnup. Questi due progetti, in collaborazione con Universitá di Genova, Ansaldo Nucleare e Politecnico di Torino

hanno dato origine ad una notevole attivitá svolta anche grazie a 3 AdR dedicati.

In parallelo, nell'ambito di una serie di progetti prima di CCR, ora di CSNV mi sono occupato di diversi aspetti legati all'utilizzo di dati fisici nella simulazione del trasporto di particelle e radiazione nella materia. Ció in collaborazione con M.G. Pia e con diversi giovani AdR e contrattisti. Si tratta di un'attivitá di un certo rilievo per gli esperimenti perché la bontá dei risultati di una simulazione é garantita quasi esclusivamente dall'affidabilitá dei dati sperimentali su cui essa si basa [32-34,36-38,40,41,44-46,50,59,69].

Mi sono pertanto occupato in particolare di quantificare come l'esistenza di incertezza parametrica (di ineliminabile origine sperimentale) [43,51] nei dati che forniscono il supporto ad una simulazione si traduca in una incertezza misurabile sul risultato della somulazione stessa. Si tratta di uno dei settori in rapida crescita nella ricerca moderna che va sotto il nome generico di Uncertainty Quantification (UQ): la mia attivitá si é rivolta esclusivamente al problema della propagazione dell'errore implicita nella simulazione ed ha portato ad alcuni risultati matematici significativi, come un'ampia generalizzazione della distribuzione di Irwin-Hall da cui é possibile derivare in modo formalmente esatto la distribuzione della probabilitá di ottenere un certo risultato dalla simulazione in presenza di N differenti incertezze parametriche. Da un punto di vista applicativo tale risultato é praticamente utilizzabile solo per valori non troppo elevati di N.

Pubblicazioni su riviste di P. Saracco

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   Lett. Nuovo Cimento, **35**(1982)97.

3. R. Cenni, G. Dillon, P. Saracco - "Medium Polarization Effects on the Particle-Hole Interaction in the Pion Channel" -
   Nuovo Cimento, **76A**(1983)447.

4. R. Cenni, G. Dillon, P. Saracco - "Pion Condensation and Medium Polarization Effects on The Spin-Isospin-Dependent Particle- Hole Interaction" -
   Nuovo Cimento, **77A**(1983)231.

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   Lett. Nuovo Cimento, **41**(1984)173.

6. R. Cenni, G. Dillon, P. Saracco - "A Note on the Functional Approach to the Effective interaction in The Nuclear Many-Body Problem" -
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7. W. M. Alberico, R. Cenni, A. Molinari, P. Saracco - "Functional Treatment of the Meson Exchange Currents" -
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8. W. M. Alberico, R. Cenni, A. Molinari, P. Saracco - "On The Renormalizability of Effective Pionic Lagrangians in the Nuclear Medium" -
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Fabrizio Parodi

Education and positions

Currently
Associate Professor, “Dipartimento di Fisica” (DIFI), Unige
Associate with research activity to Istituto Nazionale Fisica Nucleare (INFN).
Associate to CERN (Geneve, Switzerland) physics laboratory.

1992 Master degree in Physics (110/110 cum laude)

1996 PhD in Physics, Dipartimento di Fisica (DIFI)

1996-1997 Postdoc, "Université de Paris-Sud / LAL " (March 1996 - September 1997)

1998-1998 Postdoc, Dipartimento di Fisica (DIFI), Unige.

1999-2014 Assistant Professor, Dipartimento di Fisica (DIFI), Unige.

2014-now Associate Professor, “Dipartimento di Fisica” (DIFI), Unige

2017 National Scientific Qualification for Full Professor

Research activity

- DELPHI experiment in LEP (1992-2003)
- LEP B-oscillation Working Group (1998-2002)
- UTFit collaboration (2000-now)
- ATLAS experiment at LHC (1998-now)

DELPHI experiment at LEP (1992-2003)

I started my scientific career in the DELPHI experiment working on B-physics. I personally conducted several different analyzes: inclusive B0-B0bar mixing, lifetime and production of the B0s meson, search for oscillations B0s-B0s in the Ds-lepton, Ds-hadron channels and inclusive secondary vertices. As coordinator of the main B-physics working group, all DELPHI articles published in the field of flavor physics since 1998 have received my active contribution.
Coordination activity:

- coordinator of the "Oscillations and lifetimes" group from 1996 to 1998 (~20 researchers)
- coordinator of the "bc physics" group since 1998 (main working group of beautyphysics and charmin DELPHI) (~50 researchers)
- DELPHI representative in the LEP B-Oscillation Working Group

Contributions to conferences as speaker:

- "B physics at LEP" (Moriond 1997)
- "B / s0 mixing, limits on Delta (m_s)" (ICHEP 1998)
- Talk “B0 (S) anti-B0 (S) oscillations at LEP and SLC " (BEACH 2002)

Organization of conferences or workshops:

- Organizer of parallel session "Physics of flavor and CP violation " at LEPTRE (Rome 2001)

UTFit collaboration (2000-now)

The need to organize and combine several different measurements on beauty physics and to infer from them the fundamental parameters of the theory (CKM matrix), led me to start a stable collaboration with experimental and theoretical researchers (UTfit collaboration). The UTfit collaboration updates periodically the results on the flavour sector of the Standard Model and test its possible extensions.

Contributions to conferences as speaker:

- "Fits to the CKM matrix" (CPconf2000)
- "Bayesian Approach for CKM Fits" (First CKM Workshop, Cern, 2002)
- "How to Include the information from the B0s-B0sbar oscillation frequency in the CKM fits" (Advanced Statistical Techniques in Particle Physics, Durham, March 2002)
- "Determination of the Unitarity Triangle parameters" (ICHEP 2002)

Organization of conferences or workshops:

- "First CKM Workshop" (CERN 13-16 Feb. 2002)
- WG3 session (CKM fits and New physics) for "Second Workshop on the CKM Unitarity Triangle" (Durham, 5-9 April 2003)

ATLAS experiment at LHC

Online tracking and b-jet trigger (1998- 2011)

Since the beginning of my activity in ATLAS, I focused the effort on real-time selections (second and third level trigger) based on the information coming from the tracking detector. In this context I contributed to the development of a pioneering tracking algorithm for the second trigger level and I directed the design, optimization and development of the real-time selection of jets containing quark beauty (b-jet trigger). This trigger represents the only possibility to select hadronic final states with b-jets and has been used for several analyzes (top, SUSY) in ATLAS.

Coordination activity:

- B-jet slice coordinator from 2001 to 2011 (~5-10 researchers)

Contributions to conferences as speaker:

- Talk "Vertexing strategy and algorithms at ATLAS" (Vertex 2004, Como)
- Talk "High level ATLAS Trigger" at the "Workshop on Monte Carlo, Physics and Simulations at LHC "(Frascati 2006)
- "Upgrade of the tracking and trigger system ATLAS and CMS" (12th International Conference on B Physics at Hadron Machines - BEAUTY 2009, 7-11 Sep 2009, Heidelberg, Germany)

B-physics in ATLAS (2003-2011)

With the first LHC data I worked on the measurement of the beauty production cross and beauty to charm cross-section ratio using D*-muon and D* final states.

Contributions to conferences as speaker:

- “ATLAS and CMS upgrade program on tracking and trigger with focus on b physics" (Beauty 2009, 12 Heidelberg, Germany)
- Heavy flavor production at ATLAS: open beauty and onia, polarizations, associated production of onia and vector bosons” (Beauty 2013, Bologna)

Organization of international

- Organization of the international conference" 8th Franco-Italian Meeting on B Physics "(Genova, 6 -7 Feb, 2012)

b-tagging (2006-)

Thanks to the expertise gained with the first data I proposed to use charm and beauty exclusive final states (D*, D* -mu) to calibrate b-jets. This effort, together with my activity as coordinator of the *b*-tagging group (2011-2013) allowed me to play a key role for all the ATLAS analyzes exploiting

b-tagging. I proposed and developed a method to exploit a binned b-tagging distribution ("*b*-continuous tagging") which has been later adopted in many analyzes (including the analysis reporting the “evidence” for Higgs decay to b-quark pairs). I contributed to develop and maintain the tools to combine calibration results.

Coordination activity:

- B-tagging coordinator from 2011 to 2013 (~100 researchers)
- Contact person for the combination of calibration results

Contributions to conferences as speaker:

- "Identification of b and tau " (First Italian workshop on ATLAS and CMS physics, 2013)
- "Tracking and b-tagging" al "X ATLAS Italia Workshop on Physics and Upgrades" (2015)

Organization of Workshop:

- Organization of ATLAS b-tagging Workshops (Genova May 2008, Nijmegen January 2012, Stockholm August 2013)

Higgs Boson (2014-)

I coordinated the analysis of the decay of the boson of Higgs in pairs of beauty quarks in the production channel with vector boson fusion (VBF) (at 8 and 13 TeV). This type of decay, with good cross section but characterized by high combinatorial background, requires the combined use of both online and offline b-jet selection. The results of these studies have been included in the paper reporting the “evidence” for Higgs decay to b-quark pairs.

Coordination activity:

- Analysis contact for the VBF Hbb analysis (~20 researchers)

Contributions to conferences as speaker:

- Overview talk "ATLAS LHC Run 2 measurements" (XXIII Cracow EPIPHANY Conference, 9-12 / 01/2017)

Organization of Workshops:

- Organization of the "ATLAS H-> bb Workshop"(Genoa, 14-17 May, 2019)

Teaching activities

Physics Degree Courses

Teaching assistant for many laboratory, computational and physics courses

Teacher:

- “Laboratorio di Calcolo B” (05/06 - 08/09)
- “Laboratorio di Fisica Computazionale 1” (15/16)
- “Laboratorio di Fisica Computazionale 2” (15/16-17/18)
- “Laboratorio 1A” (16/17-17/18)
- “Laboratorio di Metodi Computazionali e Statistici” (18/19-20/21)
- “Metodi di Simulazione Applicati alla Fisica” (18/19-20/21)

Mathematics Degree Courses

Teacher:

- General Physics II (11/12 -14/15)

Civil and Environmental Engineering Degree Courses

Teacher:

- General Physics (mod 2) (15/16-20/21)

Lectures for the PhD in Physics

- "Flavor Physics and the CKM matrix fit" (06/07-08/09)
- “LHC Physics” (09/10-10/11)

- "Statistics for data analysis" (13/14-18/19)

Member of Physics Department Committees

- Member of “Commissione Programmazione”, committee planning teaching staff recruitment (3 mandates since 2012)
- Member of “Commissione Ricerca ”, committee dealing and coordinating research projects and research grants.
- Member of the IT Commission (2008-2012).
- Member of the Doctoral Council (2013-2018)
- Member of the Council of the Medical Physics School (2015-now)

Member of Selection Boards

- Member of Physics Master and Diploma Degree Board
- Member of Phd Final Exam Boards: Turin (2011), Marseille (2013), Padua (2017)
- Chair of Phd Final Exam Board: Genoa (2020)
- Member of PhD Admission Board (2015 and 2017)
- Member of several commissions for research fellowships funded by INFN or the University of Genoa.
- Member of Commissions for Assistant Professor recruitment (Milano-Bicocca March 2007 Padua February 2019)
- Commission Chair for Assistant Professor recruitment (Genoa, December 2019)

Member of editorial committees

- EdBoard member for many papers and internal notes (>20)
- EdBoard chair for 3 papers (based on b-tagging)

Scientific responsibility for research projects (international and national)

- Genoa “Group I” (Particle Physics at Collider) coordinator (2015-2019). The activity involves the coordination and management of the funds assigned to Genoa group from the National Scientific Commission 1 (CSN1) of INFN (about 80000 euros per year). As Genoa coordinator I was also part of CSN1 which manages the funds for Particle Physics at Collider (annual budget of about 20 million euros).
- Referee for the MEG experiment (at PSI) for CSN1 (average annual budget about 500,000 euros).

Training

- Supervisor of 9 Master theses and 1 Diploma thesis.
- Supervisor of 5 PhD theses
- Tutor for 3 Post-doc fellowship (2 years each)

Outreach

Main proponent and responsible for the following “Festival della Scienza” events:

- “Alla scoperta del Higgs Boson” (2015)
- “Particelle elementari: contatto !” (2017)

Contributor to proposal for “Festival della Scienza” events:

- "Unite i puntini ed otterrete una particella !” (2018)

Organizer/contributor of various scientific dissemination activities:

- "Researchers' Night" (2016)

- "International Masterclasses - hands on particle physics" (from 2013, local coordinator from 2019)
- "Art & Science" (2019 and 2020): activities and seminars for schools
- Internships for high school students

Simone Marzani

Curriculum Vitae

Academic Positions

2020–to date **Associate Professor**, *Università di Genova*, Genoa, Italy.

2017–2020 **Researcher (tenure-track)**, *Università di Genova*, Genoa, Italy.

2015–2017 **Assistant Professor**, *University at Buffalo, The State University of New York*, Buffalo, NY.

2014–2015 **Research Associate**, *Massachusetts Institute of Technology*, Cambridge, MA.

2011–2014 **Research Associate**, *Institute for Particle Physics Phenomenology, Durham University*, Durham, England.

2008–2011 **Research Associate**, *University of Manchester*, Manchester, England.

Education

2005–2008 **PhD in Theoretical Particle Physics**, *University of Edinburgh*, Edinburgh, Scotland.

2000–2005 **Masters Degree in Physics**, *Università degli Studi di Milano*, Milano, Italy.

1995–2000 **High School**, *Liceo Scientifico Statale Vittorio Veneto*, Milano, Italy.

Additional Training

2007 **CTEQ Summer School on QCD Analysis and Phenomenology**, Madison, WI.

2006 **36th British Universities Summer School in Theoretical Elementary Particle Physics**, Edinburgh, Scotland.

2006 **XI Frascati Bruno Touschek Spring School**, *LNF*, Frascati, Italy.

Languages

- Italian: native
- English: fluent
- Spanish: basic
- French: basic

Professional Activities

Grants and Awards

2020 Durham IPPP Visiting Academics (DIVA) fellowship.

2019 "Using jets to challenge the Standard Model of particle physics" (Università di Genova *Curiosity Driven* grant).

2018 "Resum(e) the path to discovery" (Royal Society International Exchanges).

2018 European Physical Journal Distinguished Referee Award.

2017 Fondo di Finanziamento delle Attività Base di Ricerca (MIUR).

UUP Professional Development Award.

2016 "All-Order Precision for LHC Phenomenology" (US National Science Foundation PHY-1619867).

UUP Professional Development Award.

2014 LHC Theory Initiative Research Fellowship (US National Science Foundation).

2005 Scottish Universities' Physics Alliance Studentship.

Memberships

2018–to date Affiliate of the Higgs Centre for Theoretical Physics, University of Edinburgh.

2017–to date Associate of Istituto Nazionale di Fisica Nucleare (INFN).

2015–2017 Member of the American Physical Society.

2014–2017 Associate Member of the Pittsburgh Particle physics, Astrophysics and Cosmology Center (PITT PACC).

2009–2014 Member of Institute of Physics.

Institutional roles

2021–to date Local Responsible at INFN Sezione di Genova for INFN SPIF (Precision Studies of Fundamental Interactions) national project.

2020–to date Member of the Physics Masters Thesis Committee

2020–2021 Member of the Civil and Environmental Engineering Thesis Committee

2018–2021 Secretary of Physics Undergraduate Teaching

2018–2021 Member of the Physics Department Research Committee

Organisation of Workshops and Conferences

2019 Organiser of the Higgs Centre workshop *Towards accuracy at small-x*, Edinburgh, Scotland.

- Convener of *Jets, Substructure and Resummation*, QCD@LHC 2019, Buffalo NY.
- Convener of *Physics at TeV Colliders* workshop, Les Houches, France.

2018 Organiser of the mini-workshop *High Accuracy Resummation & Parton Showers*, Genova, Italy.

- Convener of Frontiera Energia at *IFAE 2018*, Milano Bicocca, Italy

2017 Organiser of *BOOST 2017*, Buffalo, NY.

2016 Organiser of *Loopfest XV*, Buffalo, NY.

Convener of the QCD session at the Standard Model at the LHC 2016 workshop, Pittsburgh, PA.

2015 Organiser of *Workshop on QCD factorization*, Buffalo, NY.

Convener of the Electro-Weak, Higgs Beyond the Standard Model Working Group at the XXIII International Workshop on Deep Inelastic Scattering and Related Subjects, Dallas Texas.

2009–2011 Organiser of the Particle Physics Group Seminars in Manchester.

2009 Organiser of *Mini-Workshop on Techniques for Eikonal Calculations*, Manchester, England.

Peer-reviews

2020 Proposal reviewer for the US National Science Foundation

2017 Proposal reviewer for the US National Science Foundation and the Netherlands Organisation for Scientific Research

2012-to date Referee for *Physical Review Letters*, *Physical Review D*, *Journal of High Energy Physics*, *Physics Letters B*, *Nuclear Physics B* and *European Physical Journal C*.

Research Stays

2018 DESY Theorist of the Month, Hamburg, Germany (1 week).

2017 MIAPP workshop Automated, Resummed and Effective: Precision Computations for the LHC and Beyond, Munich, Germany (2 weeks).

2016 KITP workshop LHC Run II and the Precision Frontier, Santa Barbara, CA (1 month).

IPhT Saclay, France (1 week).

2015 CERN, Switzerland (10 days).

Oxford University, England (1 week).

2014 IPhT Saclay, France (2 weeks).

Georg-August-Universität Göttingen, Germany (1 week).

2013 ESI Program on Jets and Quantum Fields for LHC and Future Colliders, Vienna, Austria (2 weeks).

2012 Visitor at CERN, Switzerland (1 week).

2009 Visitor at Bergische Universität Wuppertal, Germany (1 week).

Teaching Experience

Mentoring and Supervision of Postdocs

2020–2022 Prasanna Dhani (INFN Genova).

2019–2021 Oleh Fedkevych (Università di Genova).

2015–2017 Vincent Theeuwes (University at Buffalo).

Mentoring and Supervision of PhD students

2019–2022 Simone Caletti (Università di Genova).

2019–2022 Anna Rinaudo (Università di Genova).

2018–2021 Alessandro Guida (Università di Genova / DESY Hamburg).

2017–2020 Chang Wu (Università di Genova).

2016–2020 Jeremy Baron (University at Buffalo).

Mentoring and Supervision of Masters students

2020–2021 Andrea Ghira (Università di Genova).

2020–2021 Dario Vaccaro (Università di Genova).

2019–2020 Alessio Fontanarossa (Università di Genova).

2018–2019 Simone Caletti (Università di Genova).

2017–2018 Alessandro Guida (Università di Genova).

2016–2017 Stephen Muehlemann (Bachelor Student, University at Buffalo).

Lectures

2020/2021 Fisica Generale A (Università di Genova);
Fisica Quantistica B (Università di Genova);
Elettrodinamica Quantistica (Università di Genova).

2019/2020 Fisica Generale A (Università di Genova);
Fisica delle Particelle Elementari (Università di Genova).
Teorie di Gaugei (Università di Genova).

2018/2019 Fisica Generale A (Università di Genova);
Fisica delle Particelle Elementari I (Università di Genova).

2017/2018 Fisica Generale A (Università di Genova);
Fisica Nucleare, delle Particelle e Astrofisica II (Università di Genova).

2016/2017 Quantum Field Theory (University at Buffalo);
General Physics I (University at Buffalo).

2015/2016 Elementary Particle Physics (University at Buffalo).

2012 Resummation in Action (Durham University).

Summer Schools

2019 QCD Master Class 2019: *Jet physics*.

2018 Sangam@HRI: *Jets and their structure*.

2014 MCnet Summer School: *Boosted-Particle Techniques*.

Tutorials

2011–2014 Tutor for undergraduate courses at Durham University.

2009–2011 Tutor for undergraduate courses at Manchester University.

2006–2008 Tutor for undergraduate courses at Edinburgh University.

2009–2010 Tutor for *39th* and *40th British Universities Summer School in Theoretical Elementary Particle Physics*.

2000-2005 Private tutor in Maths, Physics and English for high school pupils.

Outreach Activities

Activities with schools and with the general public

2009-2012 Activities as STEM (Science, Technology, Engineering and Mathematics) Ambassador, e.g. motivational days in high-schools and SciBar in Greater Manchester area.

2010 Organiser of the weekly Physics Club at Whalley Range High School, Manchester.

2009-2010 Particle Physics Masterclass: introduction to particle physics for A-level students.

Other experience

2005 Scientific animator at the Science and Technology Museum *Leonardo da Vinci* in Milano, Italy.

Books

Title *Looking inside jets: an introduction to jet substructure and boosted-object phenomenology.*

Authors Simone Marzani, Gregory Soyez, and Michael Spannowsky.

Edition Springer Lecture Notes in Physics (2019).

PhD Thesis (2008)

Title *High Energy Resummation in Quantum Chromo-Dynamics.*

Supervisors Prof. Richard D. Ball and Dr. Thomas Binoth.

Masters Thesis (2005)

Title *The BFKL kernel at next-to-next-to leading order.*

Supervisors Prof. Stefano Forte and Dr. Alessandro Vicini.

Journal Publications

The Authors' list in high-energy physics is usually alphabetical. Rare exceptions to this rule imply a significant contribution from the first Author(s).

2020 – A. Kasieczka, S. Marzani, G. Soyez, and G. Stagnitto, *Towards Machine Learning Analytics for Jet Substructure*, JHEP **09** (2020) 195, arXiv:2007.04319 [hep-ph].

– G. Buckley, G. Callea, A. J. Larkoski, and S. Marzani, *An Optimal Observable for Color Singlet Identification*, SciPost Phys. 9, 026 (2020) arXiv:2006.10480 [hep-ph].

2019 – A. J. Larkoski, S. Marzani and C. Wu, *Safe Use of Jet Pull*, JHEP **01** (2020) 104, arXiv:1911.05090 [hep-ph].

– S. Marzani, D. Reichelt, S. Schumann, G. Soyez and V. Theeuwes, *Fitting the Strong Coupling Constant with Soft-Drop Thrust*, JHEP **11** (2019) 179, arXiv:1906.10504 [hep-ph].

– A. J. Larkoski, S. Marzani and C. Wu, *Theory Predictions for the Pull Angle*, Phys. Rev. D **99** (Rapid Com.) (2019) 091502, arXiv:1903.02275 [hep-ph].

2018 – M. Bonvini, and S. Marzani, *Four-loop splitting functions at small x*, JHEP **06** (2018) 145, arXiv:1805.06460 [hep-ph].

– J. Baron, S. Marzani and V. Theeuwes, *Soft-Drop Thrust*, JHEP **08** (2018) 105, arXiv:1803.04719 [hep-ph].

– M. Bonvini and S. Marzani, *Double resummation for Higgs production*, Phys. Rev. Lett. **120** (2018) 202003 , arXiv:1802.07758 [hep-ph].

2017 – S. Marzani, L. Schunk, and G. Soyez, *The jet mass distribution after Soft Drop*, Eur. Phys. J. C **78** (2018) 2, 96, arXiv:1712.05105 [hep-ph].

– R. D. Ball, V. Bertone, M. Bonvini, S. Marzani, J. Rojo, and L. Rottoli, *Parton distributions with small-x resummation: evidence for BFKL dynamics in HERA data*, Eur. Phys. J. C **78** (2018) no.4, 321, arXiv:1710.05935 [hep-ph].

– M. Bonvini, S. Marzani, and C. Muselli, *Towards parton distribution functions with small-x resummation: HELL 2.0*, JHEP **12** (2017) 117, arXiv:1708.07510 [hep-ph].

– A. Tripathee, W. Xue, A. Larkoski, S. Marzani, and J. Thaler, *Jet Substructure Studies with CMS Open Data*, Phys. Rev. D. **96** (2017) no.7, 074003 (Editors' Suggestion), arXiv:1704.05842 [hep-ph].

– A. Larkoski, S. Marzani, J. Thaler, A. Tripathee and W. Xue, *Exposing the QCD Splitting Function with CMS Open Data*, Phys. Rev. Lett. **119** (2017) 132003 (Editors' Suggestion), arXiv:1704.05066 [hep-ph].

– S. Marzani, L. Schunk and G. Soyez, *A study of jet mass distributions with grooming,* JHEP **07** (2017) 132, arXiv:1704.02210 [hep-ph].

2016 – S. Marzani, and V. Theeuwes, *Vector boson production in joint resummation*, JHEP **02** (2017) 127, arXiv:1612.01432

– M. Bonvini, S. Marzani, and T. Peraro, *Small-x resummation from HELL*, Eur. Phys. J. C **76** (2016) 11, 597, arXiv:1607.02153 [hep-ph].

– F. Caola, S. Forte, S. Marzani, C. Muselli, and G. Vita, *The Higgs transverse momentum spectrum with finite quark masses beyond leading order*, JHEP **08** (2016) 150, arXiv:1606.04100 [hep-ph].

– M. Bonvini, S. Marzani, C. Muselli, and L. Rottoli, *On the Higgs cross section at N^3LO+N^3LL and its uncertainty*, JHEP **08** (2016) 105, arXiv:1603.08000 [hep-ph].

- J. Dolen, P. Harris, S. Marzani, S. Rappoccio, N. Tran, *Thinking outside the ROCs: Designing Decorrelated Taggers (DDT) for jet substructure*, JHEP **05** (2016) 156, arXiv:1603.00027 [hep-ph].

2015
- S. Marzani, *Combining Q_T and small-x resummations*, Phys. Rev. D **93** (2016) 054047, arXiv:1511.06039 [hep-ph].
- W. Beenakker, C. Borschensky, M. Krämer, A. Kulesza, E. Laenen, S. Marzani and J. Rojo, *NLO+NLL squark and gluino production cross-sections with threshold-improved parton distributions* , Eur. Phys. J. C **76** (2016) 2, 53, arXiv:1510.00375 [hep-ph].
- M. Bonvini, S. Marzani, J. Rojo, L. Rottoli, M. Ubiali, R. D. Ball, V. Bertone, S. Carrazza, and Nathan P. Hartland. *Parton distributions with threshold resummation*, JHEP **1509** (2015) 191, arXiv:1507.01006 [hep-ph].
- G. Luisoni and S. Marzani, *QCD Resummation for hadronic final-states,* J. Phys. G **42** (2015) 103101 (Topical Review), arXiv:1505.04084 [hep-ph].
- C. Muselli, M. Bonvini, S. Forte, S. Marzani and G. Ridolfi, *Top Quark Pair Production beyond NNLO,* JHEP **1508** (2015) 076, arXiv:1505.02006 [hep-ph].
- A. J. Larkoski, S. Marzani and J. Thaler, *Sudakov Safety in perturbative QCD,* Phys. Rev. D **91** (Rapid Com.) (2015) 111501, arXiv:1502.01719 [hep-ph].

2014
- E. Gerwick, S. Hoeche, S. Marzani and S. Schumann, *Soft evolution of multi-jet final states*, JHEP **1502** (2015) 106, arXiv:1411.7325 [hep-ph].
- M. Bonvini and S. Marzani, *Resummed Higgs cross section at N^3LL*, JHEP **1409** (2014) 007, arXiv:1405.3654 [hep-ph].
- M. Bonvini, R. D. Ball, S. Forte, S. Marzani and G. Ridolfi, *Updated Higgs cross section at approximate N^3LO*, J. Phys. G **41** (2014) 095002, arXiv:1404.3204 [hep-ph].
- A. J. Larkoski, S. Marzani, G. Soyez and J. Thaler, *Soft Drop*, JHEP **1405** (2014) 146, arXiv:1402.2657 [hep-ph].

2013
- A. Ferroglia, S. Marzani, B. D. Pecjak and L. L. Yang, *Boosted top production: factorization and resummation for single-particle inclusive distributions*, JHEP **1401** (2014) 028, arXiv:1310.3836 [hep-ph].
- M. Dasgupta, A. Fregoso, S. Marzani and A. Powling, *Jet substructure with analytical methods*, Eur. Phys. J. C **73** 11 (2013) 2623, arXiv:1307.0013[hep-ph].
- M. Dasgupta, A. Fregoso, S. Marzani and G. P. Salam, *Towards an understanding of jet substructure*, JHEP **1309** (2013) 029, arXiv:1307.0007[hep-ph].
- R. D. Ball, M. Bonvini, S. Forte, S. Marzani and G. Ridolfi, *Higgs production in gluon fusion beyond NNLO*, Nucl. Phys. B **874** (2013) 746, arXiv:1303.3590 [hep-ph].

2012
- S. Marzani, *Phenomenology of electro-weak bosons at hadron colliders with novel variables*, Mod. Phys. Lett. A, Vol. 27, No. 26 (2012) arXiv:1207.4279 [hep-ph].

- M. Dasgupta, K. Khelifa-Kerfa, S. Marzani and M. Spannowsky, *On jet mass distributions in Z+jet and dijet processes at the LHC*, JHEP **1210** (2012) 126, arXiv:1207.1640 [hep-ph].
- A. Banfi, M. Dasgupta, S. Marzani and L. Tomlinson, *Predictions for Drell-Yan ϕ^* and Q_T observables at the LHC*, Phys. Lett. B **715** (2012) 152, arXiv:1205.4760 [hep-ph].

2011
- A. Banfi, M. Dasgupta, S. Marzani and L. Tomlinson, *Probing the low transverse momentum domain of Z production with novel variables*, JHEP **1201** (2012) 044, arXiv:1110.4009 [hep-ph].
- R. M. D. Delgado, J. R. Forshaw, S. Marzani and M. H. Seymour, *The dijet cross section with a jet veto*, JHEP **1108** (2011) 157, arXiv:1107.2084 [hep-ph].
- A. Banfi, M. Dasgupta and S. Marzani, *QCD predictions for new variables to study dilepton transverse momenta at hadron colliders*, Phys. Lett. B **701** (2011) 75, arXiv:1102.3594 [hep-ph].
- F. Caola and S. Marzani, *Finite fermion mass effects in pseudoscalar Higgs production via gluon-gluon fusion*, Phys. Lett. B **698** (2011) 275, arXiv:1101.3975 [hep-ph].

2010
- F. Caola, S. Forte and S. Marzani, *Small x resummation of rapidity distributions: the case of Higgs production*, Nucl. Phys. B **846** (2011) 167, arXiv:1010.2743 [hep-ph].
- A. Banfi, M. Dasgupta, K. Khelifa-Kerfa and S. Marzani, *Non-global logarithms and jet algorithms in high-p_T jet shapes*, JHEP **1008** (2010) 064, arXiv:1004.3483 [hep-ph].

2009
- R. V. Harlander, H. Mantler, S. Marzani and K. J. Ozeren, *Higgs production in gluon fusion at next-to-next-to-leading order QCD for finite top mass*, Eur. Phys. J. C **66** (2010) 359, arXiv:0912.2104 [hep-ph].
- J. Forshaw, J. Keates and S. Marzani, *Jet vetoing at the LHC*, JHEP **0907** (2009) 023, arXiv:0905.1350 [hep-ph].

2008
- S. Marzani and R. D. Ball, *High Energy Resummation of Drell-Yan Processes*, Nucl. Phys. B **814** (2009) 246, arXiv:0812.3602 [hep-ph].
- S. Marzani, R. D. Ball, V. Del Duca, S. Forte and A. Vicini, *Higgs production via gluon-gluon fusion with finite top mass beyond next-to-leading order*, Nucl. Phys. B **800** (2008) 127, arXiv:0801.2544 [hep-ph].

2007
- S. Marzani, R. D. Ball, P. Falgari and S. Forte, *BFKL at Next-to-Next-to-Leading Order*, Nucl. Phys. B **783** (2007) 143, arXiv:0704.2404 [hep-ph].

Reports and Conference Proceedings

2020
- S. Amoroso *et al.*, *Les Houches 2019: Physics at TeV Colliders: Standard Model Working Group Report* , arXiv:2003.01700 [hep-ph].

2019
- M. Cepeda *et al.*, *Higgs Physics at the HL-LHC and HE-LHC*, arXiv:1902.00134 [hep-ph].

2018 – J. Bendavid *et al.*, *Les Houches 2017: Physics at TeV Colliders Standard Model Working Group Report*, arXiv:1803.07977 [hep-ph].

2016 – D. de Florian *et al.* [The LHC Higgs Cross Section Working Group Collaboration], *Handbook of LHC Higgs Cross Sections: 4. Deciphering the Nature of the Higgs Sector*, arXiv:1610.07922 [hep-ph].

2015 – D. Adams, A. Arce, L. Asquith, M. Backovic, T. Barillari, P. Berta, D. Bertolini and A. Buckley *et al.*, *Towards an Understanding of the Correlations in Jet Substructure*, Eur. Phys. J. **C 75** (2015) 9, 409 arXiv:1504.00679 [hep-ph]. *Report of BOOST 2013, hosted by the University of Arizona, 12-16 August 2013*.

2013 – M. Dasgupta, S. Marzani and G. P. Salam, *QCD calculations for jet substructure*, PoS RADCOR **2013** (2014) 047 [Nuovo Cim. C **037** (2014) 02, 131], arXiv:1311.6514 [hep-ph]. *Talk presented at various conferences including ESI Program on Jets and QFT, Boost 2013, QCD@LHC 2013 and Radcor 2013*.

– A. Altheimer, A. Arce, L. Asquith, J. Backus Mayes, E. Bergeaas Kuutmann, J. Berger, D. Bjergaard and L. Bryngemark *et al*, *Boosted objects and jet substructure at the LHC*, arXiv:1311.2708 [hep-ex]. Eur. Phys. J. **C 74** (2014) 3, 2792 *Report of BOOST 2012, held at IFIC Valencia, 23rd-27th of July 2012*.

– S. Marzani, *Q_T and ϕ^* observables in Drell-Yan processes*, EPJ Web Conf. **49** (2013) 14007, *Prepared for Hadron Collider Physics Symposium 2012, Kyoto, Japan 12-16 November 2012*.

2012 – S. Marzani, *Probing colour flow with jet vetoes*, arXiv:1205.6808 [hep-ph], *Prepared for XX International Workshop on Deep Inelastic Scattering and Related Subjects (DIS 2012), Bonn, Germany, 26-30 March 2012*.

2011 – S. Marzani, A. Banfi, M. Dasgupta and L. Tomlinson, *Accurate QCD predictions for new variables to study dilepton transverse momentum*, arXiv:1106.6294 [hep-ph], *Prepared for XIX International Workshop on Deep Inelastic Scattering and Related Subjects (DIS 2011), Newport News, Virginia, USA 11-15 April 2011*.

– S. Marzani, F. Caola and S. Forte, *High energy resummation for rapidity distributions*, arXiv:1106.6297 [hep-ph], *Prepared for XIX International Workshop on Deep Inelastic Scattering and Related Subjects (DIS 2011), Newport News, Virginia, USA 11-15 April 2011*.

2010 – S. Marzani, *High-energy resummation at the LHC: the case of Drell-Yan processes*, Nucl. Phys. Proc. Suppl. **205–206** (2010) 25–30, arXiv:1006.2314 [hep-ph].

– M. Deile *et al*, *13th International Conference on Elastic and Diffractive Scattering (Blois Workshop) - Moving Forward into the LHC Era*, arXiv:1002.3527 [hep-ph].

– R. Harlander, H. Mantler, S. Marzani and K. Ozeren, *Higgs production in gluon fusion at NNLO for finite top quark mass*, arXiv:1001.2971 [hep-ph].

– M. Campanelli *et al*, *Proceedings of the workshop Standard Model at the LHC, University College London 30 March - 1 April 2009,* arXiv:1001.1287 [hep-ph].

2009 – S. Marzani and R. D. Ball, *Drell-Yan processes in the high-energy limit*, arXiv:0906.4729 [hep-ph].

– S. Marzani, J. Forshaw and J. Keates, *Gaps between jets and soft gluon resummation*, arXiv:0906.2418 [hep-ph].

2008 – S. Marzani, R. D. Ball, V. del Duca, S. Forte and A. Vicini, *Finite top mass effects in Higgs boson production at high energy*, *Prepared for 16th International Workshop on Deep Inelastic Scattering and Related Subjects (DIS 2008), London, England, 7-11 Apr 2008*.

– S. Marzani, R. D. Ball, P. Falgari and S. Forte, *Approximate BFKL kernel from DGLAP anomalous dimension*, *Prepared for 16th International Workshop on Deep Inelastic Scattering and Related Subjects (DIS 2008), London, England, 7-11 Apr 2008*.

– S. Marzani, R. D. Ball, V. Del Duca, S. Forte and A. Vicini, *Finite-top-mass effects in NNLO Higgs production*, Nucl. Phys. Proc. Suppl. **186** (2009) 98 [arXiv:0809.4934 [hep-ph]].

2007 – J. Bartels *et al*, *12th International Conference on Elastic and Diffractive Scattering (Blois Workshop) - Forward Physics and QCD*, arXiv:0712.3633 [hep-ph].

Talks in Conferences and Workshops

Invited Plenary Talks

2020 – BOOST 2020. July 20th - July 24th 2020, online webinars. Talk: *Theory Advances*.

2019 – 15th Vienna Central European Seminar on Particle Physics and Quantum Field Theory, November 28th - November 29^{th} 2019, TU Wien, Austria Talk: *Jet substructure*.

– Higgs Couplings 2019, September 30th - October 4^{th} 2019, University of Oxford, UK. Talk: *Jet substructure for Higgs physics*.

– Interpreting the LHC Run 2 Data and Beyond, May 27th - May 31^{st} 2019, ICTP Trieste, Italy. Talk: *Jet substructure at the LHC and beyond*.

– ATLAS $H \to bb$ workshop. May 14th - May 17^{th} 2019, Genoa, Italy Talk: $H \to bb$ *and jet substructure: a theorist's perspective on jet substructure*.

– Standard Model at the LHC 2019. April 23th - April 26^{th} 2019, Zurich, Switzerland. Talk: *Jet substructure theory*.

2018 – QCD@LHC 2018. August 27th - August 31st 2018, Dresden, Germany. Talk: *Jet substructure and H/V/top tagging*.

– Particleface meeting. February 26th - February 27th 2018, Valencia, Spain. Talk: *Measuring jet substructure*.

2017 – Monte Carlo for Beyond Standard Model physics (MC4BSM) 2017. May 11th - May 13th 2017, SLAC, CA, USA Talk: *Dissecting Jets*.

2016 – Advances in QCD. October 26th - October 28th 2016, Argonne National Lab, IL, USA. Talk: *Resummation in PDFs*.

- Multi-Boson Interactions 2016. August 24$^{\text{th}}$ - August 26$^{\text{th}}$ 2016, Madison, WI, USA. Talk: *Jet substructure*.
- BOOST 2016. July 18$^{\text{th}}$ - July 22$^{\text{nd}}$ 2016, Zurich, Switzerland. Talk: *Theory summary*.
- Stress-testing the Standard Model at the LHC. May 23$^{\text{rd}}$ - May 27$^{\text{th}}$ 2016, Santa Barbara, CA, USA. Talk: *Resummation for precision*.
- Standard Model at LHC 2016 May 3$^{\text{rd}}$ - May 6$^{\text{th}}$ 2016, Pittsburgh, PA, USA. Summary Talk: *QCD Outlook*.

2015
- XXIII International Workshop on Deep Inelastic Scattering and Related Subjects, April 27$^{\text{th}}$ - May 1$^{\text{st}}$ 2015, Dallas, TX, USA. Summary Talk: *Electro-Weak, Higgs & BSM Working Group*.

2014
- QCD and Beyond at Colliders, November 13$^{\text{th}}$-14$^{\text{th}}$ 2014, Pittsburgh Particle Physics, Astrophysics, Cosmology Center, PA, USA. Talk: *Soft Drop*.
- HeavyBos 2014, August 24$^{\text{th}}$-26$^{\text{th}}$ 2014, University of Glasgow, Scotland. Talk: *Jet masses & substructure: a theory viewpoint*.
- BOOST 2014, August 18$^{\text{th}}$-22$^{\text{nd}}$ 2014, University College London, England. Talk: *Soft Drop*.
- Standard Model at LHC 2014, April 8$^{\text{th}}$- April 11$^{\text{th}}$ 2014, Madrid, Spain. Review Talk: *QCD Resummation*.

2013
- Institute of Physics Half Day Meeting on Jet Substructure for Monte Carlo Tuning, October 15th 2013, Glasgow, Scotland. Invited Talk: *Analytic calculations for jet substructure*.
- BOOST 2013, August 12$^{\text{th}}$- August 16$^{\text{th}}$ 2013, Flagstaff, AZ, USA. Talk: *Pruning and mass-drop with analytical methods*.
- Resummation and Parton Showers 2013, July 15$^{\text{th}}$- July 17$^{\text{th}}$ 2013, Durham, England. Talk: *QCD resummation for jet substructure observables*.
- ESI Program on Jets and Quantum Fields for LHC and Future Colliders, July 1$^{\text{st}}$- August 3$^{\text{rd}}$ 2013, Vienna, Austria. Invited Talk: *Jet substructure*.
- Using jet substructure, April 23$^{\text{rd}}$-26$^{\text{th}}$ 2013, Eugene, USA. Talk: *Jet substructure: back to basics*.

2012
- BOOST 2012, July 23$^{\text{rd}}$-27$^{\text{th}}$ 2012, Valencia, Spain. Talk: *QCD resummation of jet masses*.
- Forward Physics at the LHC 2010, December 12$^{\text{th}}$ -13$^{\text{th}}$ 2010, Manchester, England. Talk: *Resummation of jet cross-sections and distributions*.

2010
- Strings and QCD, November 16^{th}-19^{th} 2010, Cagliari, Italy. Lecture: *Deep Inelastic Scattering at small* x, Seminar: *Small-*x *resummation for LHC phenomenology* .
- Loops and Legs in Quantum Field Theory 2010, April 25^{th} -30$^{\text{th}}$ 2010, Wörlitz, Germany. Talk: *High-energy resummation of Drell-Yan processes*.

2009 – Forward Physics at the LHC 2009, December 12th -14th 2009, Manchester, England. Talk: *Gaps between jets at the LHC*.

– 13th International Conference on Elastic and Diffractive Scattering, June 29th - July 3rd 2009, CERN Geneva, Switzerland. Talk: *Soft gluon resummation for gaps between jets*.

Other Talks (both plenary and parallel)

2019 – QCD@LHC 2019. July 15th - July 19th 2019, Buffalo NY, USA. Talk: *Jet Pull*.

2018 – QCD@LHC 2018. August 27th - August 31st 2018, Dresden, Germany. Talk: *Double resummation for Higgs production*.

– Electrons for the LHC - LHeC/FCCeh and Perle Workshop, June 27^{th}-29th 2018, Orsay, France Talk: *On the impact of small-x resummation* (remote).

2016 – Milan Christmas meeting 2016, December 21^{st}-22nd 2016, Milan, Italy. Talk: *Towards parton fits with resummation*.

2015 – Milan Christmas meeting 2015, December 21^{st}-22nd 2015, Milan, Italy. Talk: *Jet physics at the LHC*.

2014 – Loopfest XIII: Radiative Corrections for the LHC and Future Colliders, June 18th-20th 2014, New York City, USA. Plenary Talk: *News from jet substructure: soft drop*.

2013 – RADCOR 2013 - 11th International Symposium on Radiative Corrections, September 22nd- September 27th 2013, Lumley Castle, County Durham, England. Plenary Talk: *Perturbative calculations for jet substructure*.

– QCD@LHC 2013, September 2nd- September 6th 2013, DESY Hamburg, Germany. Invited Talk: *QCD resummation for jet substructure observables*.

2012 – Hadron Collider Physics Symposium 2012, November 12th-16th 2012, Kyoto, Japan. Invited Talk: *ϕ^* and Q_T observables in Drell-Yan*.

– XX International Workshop on Deep Inelastic Scattering and Related Subjects, March 26th - 30 th 2012, Bonn, Germany. Talks: *Probing colour-flow with jet vetoes*, and *QCD resummation for jet-mass distributions*.

– LHCphenonet Meeting 2012, March 19th-22nd 2012, Lumley Castle, County Durham, England. Talk: *The low-Q_T domain of the Z boson*.

2011 – QCD@LHC 2011, August 22nd-26th 2011, St. Andrews, Scotland. Invited Talk: *Colour flow in hard scattering processes*.

– XIX International Workshop on Deep Inelastic Scattering and Related Subjects, April 11th - 15th 2011, Newport News, VA, USA. Talks: *QCD resummation for new variables to study dilepton transverse momentum*, and *High-energy resummation of rapidity distributions*, and *The dijet cross-section with a jet veto*.

2010 – Soft Gluons and New Physics, November 1^{st} -2nd 2010, Manchester, England. Talk: *Soft gluon radiation in LHC jet shapes*.

- LoopFest IX: Radiative Corrections for the LHC and Lepton Colliders, June 21st -23rd 2010, Stony Brook, NY, USA. Plenary Talk: *Finite top mass effects in NNLO Higgs production*.

2009
- Mini-Workshop on Techniques for Eikonal Calculations, November 4th - 6th 2009, Manchester, England. Talk: *Coulomb gluons in gaps between jets*.
- Institute on Parton Shower and Resummation, May 2009, DESY Hamburg, Germany. Invited Contributions: *Soft gluon resummation*, and *Drell-Yan processes in the high-energy limit*.
- Collider Physics 2009: Joint Argonne & IIT Theory Institute, May 18th -22th 2009, Chicago, IL, USA. Talk: *Gaps between jets at the LHC*.
- XVII International Workshop on Deep Inelastic Scattering and Related Subjects, April 26th - 30th 2009, Madrid, Spain. Talks: *Drell-Yan processes in the high-energy limit*, and *Gaps-between-jets and soft gluon resummation*.
- Annual conference of the High Energy Particle Physics group of the Institute of Physics, April 6th -8th 2009, Oxford, England. Talk: *Gaps between jets*.
- Standard Model Discoveries with early LHC data, March 30th - April 1st 2009, University College London, England. Talk: *Gaps between jets at the LHC*.

2008
- QCD 08 14th International QCD Conference, July 7th - 12th 2008, Montpellier, France. Talk: *Finite-top-mass effects in NNLO Higgs production*.
- 4th Workshop on the implications of HERA for LHC physics, May 26th - 30th 2008, CERN Geneva, Switzerland. Talk: *Finite-mass corrections to NNLO Higgs production*.
- XVI International Workshop on Deep Inelastic Scattering and Related Subjects, April 7th - 11th 2008, University College London, England. Talks: *Finite top mass effects in Higgs production at high energy*, and *Approximate BFKL kernel from DGLAP anomalous dimension*.

2007
- 12th International Conference on Elastic and Diffractive Scattering, May 22nd - 25th 2007, DESY Hamburg, Germany. Talk: *BFKL at NNLO*.

Invited Seminars and Colloquia

2020
- *Think harder, think deeper: new ideas in jet physics*, June 15th 2020,Universität Siegen, Germany.
- *Think harder, think deeper: new ideas in jet physics*, May 28th 2020, KIT Karlsruhe, Germany.

2019
- *Jets for the LHC and beyond*, May 23rd 2019, Technische Universität München, Munich, Germany.
- *Ideas and tools in jet physics*, March 20th 2019, Department of Mathematics, Univerisità Genova, Genoa, Italy.
- *Jets for the LHC and beyond*, February 5th 2019, Univerisità Roma III, Rome, Italy.

- *Jets for the LHC and beyond*, January 15th 2019, University of Cambridge, Cambridge, England.

2018
- *QCD@small-x*, November 14^{th} 2018, DESY Hamburg, Germany.
- *All-orders calculations for PDFs determination*, October 10^{th} 2018, Milano, Italy.
- *Dissecting jets*, Albert-Ludwigs-Universität Freiburg, April 25^{th} 2018, Freiburg, Germany.
- *All-orders calculations for PDFs determination*, Universität Wien, April 13^{th} 2018, Vienna, Austria.
- *Dissecting jets*, Università di Torino, March 22^{nd} 2018, Torino, Italy.
- *All-orders calculations for PDFs determination*, January 15^{th} 2018, DESY Hamburg, Germany.

2017
- *Dissecting jets*, University of Cambridge, November 3^{rd} 2017, Cambridge, England.
- *Dissecting jets*, Nikhef, September 7^{th} 2017, Amsterdam, The Netherlands.
- *Dissecting jets*, ETH June 26^{th} 2017, Zurich, Switzerland.
- *Looking inside jets*, University of Edinburgh January 9^{th} 2017, Edinburgh, Scotland.

2016
- *Looking inside jets*, Università degli Studi di Genova, December 20^{th} 2016 Genoa, Italy.
- *Jet substructure: from phenomenology to theory and back*, Cornell University, March 16th 2016 Ithaca, NY, USA.

2015
- *Jets for LHC Run II*, Michigan State University, September 29th 2015 East Lansing, MI, USA.
- *Jet physics at LHC Run II*, New York City College of Technology, March 19th 2015 New York, NY, USA.
- *Jet physics at LHC Run II*, Argonne National Laboratory, February 25th 2015 Lemont, IL, USA.
- *Jet physics at LHC Run II*, University of Chicago, February 23rd 2015 Chicago, IL, USA.
- *Jet substructure: a QCD viewpoint*, University of Oxford, January 15th 2015 Oxford, England.

2014
- *Jet substructure: a QCD viewpoint*, State University of New York at Stony Brook, November 6th 2014 Stony Brook, NY, USA.
- *The Higgs cross-section from analyticity*, Brookhaven National Laboratory, November 5th 2014 Brookhaven, NY, USA.
- *Jet substructure: a QCD viewpoint*, SLAC National Laboratory, October 17th 2014 Menlo Park, CA, USA.
- *Jet substructure: a QCD viewpoint*, Lawrence Berkeley National Laboratory, October 15th 2014 Berkeley, CA, USA.
- *Perturbative QCD calculations for jet substructure*, University of Sussex, June 2nd 2014 Brighton, England.

- *Perturbative QCD calculations for jet substructure*, Università degli Studi di Milano, March 27th 2014 Milano, Italy
- *Exploring fundamental physics at the LHC*, State University of New York at Buffalo, February 27th 2014 Buffalo, USA.

2013
- *An analytical understanding of jet substructure*, Institute de Physique Théorique, November 20th 2013 Saclay, France.
- *An analytical understanding of jet substructure*, Nikhef, November 7th 2013 Amsterdam, The Netherlands.
- *Jets and their properties*, KIT, November 6th 2013 Karlsruhe, Germany.
- *An analytical understanding of jet substructure*, Max-Planck-Institut fuer Physik, October 28th 2013 Munich, Germany.
- *QCD calculations for jet substructure*, Georg-August-Universität Göttingen, June 14th 2013 Gottingen, Germany.
- *The Higgs cross section beyond NNLO from analyticity*, ETH & Universität Zürich, May 28th 2013 Zurich, Switzerland.
- *Perturbative QCD calculations for jet substructure*, Massachusetts Institute of Technology, May 1st 2013 Cambridga, MA, USA.
- *Perturbative QCD calculations for jet substructure*, John Hopkins University, April 30th 2013 Baltimore, MD, USA.
- *Perturbative QCD calculations for jet physics*, LPTHE Paris, February 15th 2013 Paris, France.
- *Perturbative QCD calculations for jet physics*, LAPTh Annecy, February 14th 2013 Annecy, France.

2012
- *Dilepton transverse momentum distribution variables at the Tevatron and the LHC*, University of Edinburgh, March 7th 2012 Edinburgh, Scotland.

2011
- *Dilepton transverse momentum distributions at hadron colliders*, University of Cambridge, November 10th 2011 Cambridge, England.
- *Dilepton transverse momentum distributions at hadron colliders*, Università degli Studi di Torino, October 25th 2011 Turin, Italy.
- *New variables to study the transverse momentum spectrum of the Z boson at hadron colliders*, RWTH Aachen University, June 16th 2011, Aachen, Germany.
- *QCD resummation for jet physics at the LHC*, University of Maryland, April 5th 2011, College Park, MD, USA.
- *QCD resummation for new variables to study dilepton transverse momentum*, DØ Electro-Weak Working Group, March 28th 2011.

2010
- *Finite fermion mass effects in NNLO Higgs production*, Paul Scherrer Institut, December 14th 2010, Villigen, Switzerland.
- *Theory and phenomenology of Gaps between Jets at the LHC*, University of Oxford, June 3rd 2010 Oxford, England.

- *Gaps between jets at the LHC*, University of Cambridge, February 4$^{\text{th}}$ 2010 Cambridge, England.

2009
- *High energy resummation in QCD*, Bergische Universität Wuppertal, December 3$^{\text{rd}}$ 2009 Wuppertal, Germany.
- *High energy resummation in QCD*, University of Southampton, November 20$^{\text{th}}$ 2009 Southampton, England.
- *Finite top-mass effects in Higgs production*, University of Liverpool, October 21$^{\text{st}}$ 2009 Liverpool, England.
- *Particle Physics in the LHC era*, Qinghai Normal University, July 19$^{\text{th}}$ 2009 Xining, China.
- *Soft gluon resummation in gaps between jets*, Università degli Studi di Milano, May 7$^{\text{th}}$ 2009 Milan, Italy.

2008
- *Higgs boson production via gluon-gluon fusion in k_t-factorisation*, University of Manchester, August 30$^{\text{th}}$ 2008, Manchester, England,

2006
- *Small-x physics*, University of Edinburgh, November 27$^{\text{th}}$ 2006, Edinburgh, Scotland.

Raffaella De Vita

Personal information:

Current position: Senior Staff Scientist,

Address:
Phone:
e-mail:

Work experience:

2004 - Today:	Staff Scientist at the Istituto Nazionale di Fisica Nucleare, Sezione di Genova; senior staff scientist from April 2019.
2015 – 2019:	Coordinator of the Nuclear Physics Group of the Istituto Nazionale di Fisica Nucleare, Sezione di Genova.
2001 – 2003:	Post-Doctoral position at the Istituto Nazionale di Fisica Nucleare, Sezione di Genova.
1998 – 2000:	Ph.D. student at the University of Genova.

Education:

Ph.D. in Physics:	University of Genova, December 2000. Thesis title: "*Measurement of the Double Spin Asymmetry in □⁺ electroproduction with CLAS*" (*Advisor:* G.Ricco, Professor of Physics, University of Genova; *External Advisor*: R.Minehart, Professor of Physics, University of Virginia.
Laurea in Physics:	University of Genova, degree obtained on June 6th 1997 with final grade of 110/100 *cum laude*, defending the thesis "*Realization of a Proton Polarized Target for Electron Scattering Experiments*" (*Advisor:* Dott. M. Anghinolfi, Senior Scientist, INFN-Genova).
High-school diploma:	Liceo Scientifico Statale G. D. Cassini, Genova: diploma obtained in July 1992 with final grade of 60/60.

Scientific Habilitation:

2014:	National habilitation of the Italian University as professor of experimental fundamental interaction physics.

Research activities:

Raffaella De Vita's main interest is related to hadron dynamics at intermediate energies (~GeV) and hadron spectroscopy, with the study of rare resonances and the search unconventional states such as exotic mesons and baryons. In recent years, she has also started a program to search for light dark matter at accelerators.
She has been conducting her research activity mainly at Jefferson Lab where she joined the CLAS Collaboration in 1998. She has been active in the collaboration covering both managerial and scientific roles. She has been spokesperson of several letters of intent and proposals such as MesonEx, which proposes the investigation of the meson spectrum with quasi-real photoproduction in Jlab-Hall B. She is supervisor of the design and construction of the quasi-real photon tagging facility that will be used to complete this physics program. She has been coordinating the CLAS12 Calibration and Commissioning Group since 2011. In June 2017 she has been elected Chair of the CLAS Collaboration. In September 2019, she has been elected Software Coordinator of the CLAS12 experiment.

- Elected CLAS12 Software Coordinator in September 2019.
- Chair of the CLAS Collaboration, 2017-2019.
- Member of the Hadron Physics Working Group for the 2017 NUPECC Long Range Plan.
- Coordinator of the INFN Genova Nuclear Physics Group, 2015-2019.
- Member of the INFN Nuclear Physics Scientific Committee (CSN3) since 2015.
- INFN Coordinator in EU-FP7-Scintilla project (Scintillation Detectors And New Technologies For Nuclear Security), 2012 – 2014.
- Member of the CLAS12 Steering Committee, 2010-2013.
- Member of the Jefferson Lab User Group Board of Directors, 2005-2007.
- Member of the CLAS Speaker Committee, 2003-2015; secretary of the CSC, 2007-2015.
- Member of the HPS (Heavy Photon Search) and BDX (Beam Dump eXperiment) Collaborations for the search of light dark matter at Jefferson Lab.
- Member of the CLAS Collaboration, 1998-present.
- Spokesperson on CLAS eg4, g11, g12 experiments and CLAS12 Meson-Ex.
- Co-leader of the CLAS12 Forward Tagger project.
- Thesis supervisor, run coordinator, analysis coordinator.
- Member of Conference IACs, organizing committees and session convener.
- Referee of international journals (EPJA, IEEE Transactions on Nuclear Science, …).

Publications:

Author of 170+ publications in refereed journals. List of selected papers:

- *Assessing the performance of SICCAS-type lead tungstate scintillators for EM calorimetry in the CLAS12 Forward Tagger at Jefferson Lab*, S. Fegan et al., Nucl. Instrum. Meth. A789 (2015) 101-108.
- *First measurement of direct $f_0(980)$ photoproduction on the proton*, M.Battaglieri et al. (CLAS collaboration), Phys. Rev. Lett. 102, (2009) 102001.
- *Search for $\Theta^+(1540)$ pentaquark in high statistics measurement of $\gamma p \rightarrow$ anti-K0 K^+n at CLAS*, M. Battaglieri et al. (CLAS collaboration), Phys. Rev. Lett. 96, (2006) 042001.
- *A polarized target for the CLAS detector*, C. Keith et al., Nucl. Instrum. Meth. A501, (2003) 327-33.
- *First Measurement of the Double Spin Asymmetry in $e\,p \rightarrow e'\,\pi^+n$ in the Resonance Region*, R. De Vita et al. (The CLAS Collaboration), Phys. Rev. Lett. 88, (2002) 082001.

Patents:

"*Device and method for detecting neutrons and gamma rays*", publication number WO2015068133A1.

Invited talks:

Summary of recent invited talks at international conferences and workshops:

- HOW2019: invited talk on *Computing activities for the JLab 12 GeV science program*.
- MENU2016: invited talk on *The CLAS12 physics program*.
- EINN2015: invited talk on *Meson Spectroscopy with CLAS and CLAS12*.
- Light Cone 2015: invited talk on *The Hadron Spectroscopy Program at Jefferson Lab*.
- CIPANP2015: summary talk on *QCD, Hadron Spectroscopy and Exotics*.
- INPC2013: invited talk on *Meson Spectroscopy in the Light Quark Sector*.

Gemma Testera

I was born on Feb 4th, 1963 in Genova (Italy).
I graduated in Physics in the year 1986 at the University of Genova. In 1988 I got a INFN scholarship for young graduated and then I obtained the phd in Physics in 1991 in the University of Genoa in collaboration with the PSI Institute in Zurich.
I have a permanent position as INFN (Istituto Nazionale di Fisica Nucleare) researcher since the year 1991. In 2003 I become First Researcher in the INFN Institute.
In 2012 I obtained the l'Abilitazione Scientifica Nazionale for a profile of University Full Professor in the sector 02/A1; (ref. bando 2012 (DD n. 222/2012)).
My scientific activity, since the time of the phd, is about experimental astroparticle physics and fundamental interactions in the framework of INFN projects.
The main scientific topics of my activity are:

1) Verification of fundamental symmetries of the physics laws (CPT and WEP) using low energy antimatter and antihydrogen.
This is an experimental program taking place at CERN including trapping, manipulating charged particles of matter and antimatter in electromagnetic traps to form antihydrogen with very low temperature (kelvin or sub-kelvin) and then perform precise spectroscopy and free-fall experiments in the Earth's gravitational field. I worked on this science since the time of the graduation until the year 2019 covering several leading roles as INFN National responsible (in the projects ATHENA and AEgIS), Physics Coordinator, (AEgIS), International spokes-person (AEgIS) and deputy spokes-person (AEgIS). I was leading the experiment ATHENA when in the year 2002 we produced for the first time cold antihydrogen by recombination of trapped positron and antiprotons.
I propose and got approval and funding of a second generation experiment (AEgIS) aiming at a pulsed production of antihydrogen for a gravity measurement.
I was the National responsible of the INFN Italian groups of the ATHENA experiment (from the year 2000 until the end of the experiment) and of the AEgIS experiment (from the beginning in the year 2009 until 2019).
I performed experimental activity about trapped particles, their cooling and manipulation, non destructive detection and I was driving all the experimental particle manipulations in the ATHENA and AEgIS experiments. In particular, referring only to the most recent results, I built all the particle manipulation procedures leading to the production of antihydrogen in pulsed mode in AEgIS.

2) Solar neutrino physics and geoneutrinos in Borexino.
This experiment is about the measurement of the flux of low energy (MeV or sub-MeV) solar neutrinos and Earth's antineutrinos with a low background liquid scintillator detector located underground (Lab. Naz. G. Sasso). I started working on this subject after the end of the phd and the activity is currently in progress. I was leading several working groups during the preparation and construction of the experiment and, particularly, I covered the role of Physics Coordinator and Responsible of the data Analysis in the period 2010-2018 during which we measured all the fluxes of the pp solar neutrinos. I was active in the analysis, in addition to its coordination, and I have driven the development of the tools that have been completed in the last year and allowed the measurement of the CNO neutrinos.
I performed experimental activity about the liquid scintillator, photomultiplier calibrations, design and test of the front end electronics during the time of the preparation of the experiment and then simulation and data analysis during the data taking (started in 2007).

3) Direct detection of dark matter in DarkSide
Since the year 2012 I'm also involved on a direct dark matter search experiments in G. Sasso based on a two phase liquid Argon Time Projection Chamber.
After the successful run of the prototype DarkSide50, the collaboration enlarged including now more than 350 scientist and we are building a large scale detector (20 ton of liquid Argon active volume) with high sensitivity and low background for the detection of dark matter in the form of WIMPs.
I'm the responsible (L1 manager) of the design, construction and installation of that part of the detector called Veto that must identify with high efficiency background neutron events mimic dark matter signals.
Starting from October 2020 I'm the National responsible of the INFN Italian groups of DarkSide.

4) I joined the Euclid consortium in 2018. With my group in Genoa I'm involved in the Galaxy Clustering Working group and in the spectroscopic simulation of the image that will be obtained with the instrument on board of the satellite.

During my activity I was always working both on hardware items and on software (simulation or analysis according to the different phases of the life of the experiments) and I gained experience on several fields: electronics (digital and radio frequency), ultra high vacuum, cryogenics, large volume liquid organic

scintillators, plastic scintillators, Photomultipliers, Micro Channel Plates and Silicon Photomultipliers, operation of superconducting magnets, traps for charged particles, non destructive trapped particle detection, cooling of trapped particles, non neutral cold plasma physics, Rydberg atoms, Monte Carlo codes based on Geant3 and Geant4, development of analysis and simulation code in C and C++, development of codes for tracking charged particles in electric and magnetic fields, advanced LabView programming for DAQ, data analysis in low background underground experiments, fit of the solar neutrino spectra with Monte Carlo based response functions, search for rare signals and experimental problems related to low background underground physics.

I always worked in the context of medium-large international collaborations on experimental apparatus mounted in international Laboratory and many times I developed small scale experimental apparatus related to these main projects in my laboratory in the INFN Institute in Genova leading to publications including small number of authors (examples are measurements of liquid scintillator and quencher properties for Borexino, development of electronics both for Athena, AEgIS and Borexino, resonant circuit and low noise amplifiers working at 4 Kelvin for AEgIS, many measurements with electrons and protons trapped in a test traps within a superconducting magnet for ATHENA and AEgIS, setup for test of Silicon Photomultipliers in cryogenic environment for DarkSide).

I was tutor of more than 10 graduate student and 10 phd thesis.

I'm writer and editor of several of the papers signed by the entire collaboration.

Among the main achieved physics results there are the first and most precise measurements of the flux of the ^{7}Be solar neutrinos with Borexino, the measurement of the ^{8}B solar neutrinos with low energy threshold, the first detection of pep neutrinos and the best limit on the CNO neutrinos, the evidence of geoneutrinos with Borexino, the first direct measurement of the pp neutrinos, many limits on rare processes obtained with Borexino and the simultaneous precision measurement of all the fluxes of neutrinos of the pp chain. Finally, in the context of Borexino there is the recent results about the first detection of CNO solar neutrinos.
In the field of low energy antimatter the most relevant results are the first production and detection of cold antihydrogen atoms in ATHENA, the dependence on the antihydrogen production on the temperature of the plasma during the recombination in ATHENA, the first excitation of the n=3 level of positronium in AEgIS and the most recent one, namely the first production of antihydrogen in pulsed mode.
In the context of direct dark matter search there are the competitive limits on direct dark matter with a small mass prototype (DS50) argon based detector and several related results.
In 2003 I got the award "Premio Regionale Ligure per la Ricerca Scientifica" thanks to the results about the first formation of cold antihydrogen atoms in ATHENA.
From 1997 to 2003 I was member of the INFN scientific comm. 2 devoted to review and approve the INFN projects about Astroparticle Physics.
I'm currently working as referee for several Journals (NIM, Phys. Lett.B, Phys. Lett. A,EPJA, Annalen der Physik, British Journal of Applied Science and Technology, JINST) and for international funding agencies (ANR e Swiss National Science Foundation).
I'm also currently member of the ANR panel for selection of proposals.
I also work as referee for INFN experiments. Particularly, before 2018, I was referee of Euclid.
I served as external referee for several phd thesis of Italian and not Italian Universities.
I was spokesperson of the AEgIS experiment from 2007 to 2010 and I was driving completely the process of the formation of the scientific collaboration, writing of the proposal and approval of the experiment. I was the deputy spokesperson of AEgIS from 2010 to 2019. I was the INFN national responsible of ATHENA (2001-2008) and the National INFN responsible of AEgIS (2010 to 2019).
Additionally I covered the role of local responsible for Borexino for 4 years. I served the same role for ATHENA during the period from 1997 to 2008.
Presently I'm the National INFN responsible of DarkSide and the local responsible of Borexino.
During the period 2014-2016 I was one of the responsible of a National Working Group On Fundamental Physics in the INFN "What Next" project which was an activity aiming to discuss and promote new ideas and projects.

In the framework of the scientific activity I coordinated many working groups (measurement of liquid scintillator optical properties in Borexino, Monte Carlo in Borexino, design and construction of the front end electronics in Borexino, measurements about the quencher for the Borexino buffer liquid, design and construction of the ATHENA and AEgIS traps, development of the plasma mode detection, data taking during for antihydrogen formation and many others, project of the DarkSide veto detector).
I served the role of Physics Coordinator of Borexino for 8 years from 2010 to 2018 and I was responsible of the whole data analysis of Borexino (physics and organization).
I was also member of the Borexino steering comm. which has the goal of driving the experimental choices and activities from the year 2012 to 2017.

Since several years I’m member of both the Borexino and Darkside Institutional Board, and I was in that board in Athena first and AEgIS later for a total of 16 years. During the period 2010-2019 I was the Physics Coordinator of AEgIS.
In the context of the dark matter activity, I’m the responsible (L1 manager) of the VETO system (neutron moderator surrounding the liquid Argon TPC) for the DarkSide 20K detector.
I was member of the DarkSide talk board for two years and I’m member of the Istitutional Board Advisory Comm.
I’m member of the Euclid committee for the assignment of the Euclid Star Prize.

I’m member of the Accademia Ligure di Scienze e Lettere in Genova and of the Convivio Del Tigullio: these are two organizations aiming at divulgation of science and culture.

I'm author of more than 300 publications.