

## **FABBRI Laura (19/10/2021)**

### **Personal Data**

Name: Dr Laura Fabbri

### **Employment and Education**

#### *Currently*

Associate Professor, "Dipartimento di Fisica e Astronomia" (DIFA), Università di Bologna (UniBo).

Associate with research activity to Istituto Nazionale Fisica Nucleare (INFN).

Associate to CERN (Geneve, Switzerland) and DESY (Hamburg, Germany) physics laboratories.

2010 – 2018 Assistant Professor, Dipartimento di Fisica e Astronomia (DIFA), UniBo.

2010 Fixed-term researcher Istituto Nazionale Fisica Nucleare (INFN), Bologna.

2004 – 2010 Postdoc, Dipartimento di Fisica, Unibo.

2004 PhD in Physics, DIFA, UniBo, OBELIX Collaboration.

### **Scholarships and Awards**

2013 HEPP European Physics Society Award (High Energy and Particle Physics Prize of the European Physical Society) awarded together with the ATLAS collaboration for the discovery of the Higgs boson.

2005 Italian Physics Society Award (SIF) for scientific industriousness.

2004 Scholarship by UniBo for research activities within the LHCb experiment.

1999 Summer Student, Fermilab Summer Student – Chicago, Illinois (USA)

### **National and International Cooperation**

#### *High Energy Physics Experiments*

< 2005 Member of OBELIX and LHCb Collaborations at CERN and HERA-B at DESY.

**>2005 Member of ATLAS Collaboration at CERN.**

#### *Research and Development on Detector*

2008-2012 Member of INFN collaboration SLIM5, VIPIX (R&D of thin tracking systems in the field of high-energy physics),

2018-today Member of INFN collaboration ELOFLEX and FIRE (R&D of a thin and flexible organic sensor for detection of X, gamma and hadronic radiation)

### **Institutional Activities and Academic Appointments**

>2020 **Chair** of the Commission for the Third Mission of the DIFA.

2018-2021 Member of the Observatory for the Evaluation of Third Mission, **representative** of the Physical Sciences area in Unibo.

2016-2020 **Department delegate** for the European project PLOTINA (Promoting gender balance and inclusion in research, innovation and training).

2018 **Department delegate** for the project "Living our Values in Higher Education Institutions: a self-evaluation instrument for universities" promoted by the Magna Carta Observatory.

2014, 2018 **Member of the Board** of the DIFA.

>2011 Member of selecting committee to hire postdocs, scholarships and tutors, DIFA, UniBo.

2012-2017 Member of selecting commissions for the assignment of research grants and the requirement of a technologist (2015) for INFN.

### Outreach and Third Mission Activities

- 2021 **Co-director** of the “ONSCI -*Officina di Narrazione della Scienza*” Summer School (<https://site.unibo.it/officina-di-narrazione-della-scienza/it>) dedicated to university students and young researchers who want to acquire knowledge and skills in storytelling and narration to be used effectively in their work as researchers and teachers as well as science communicators.
- 2020 Celebrations for the first centenary of Augusto Righi's demise (**organizing committee**) [<https://eventi.unibo.it/righi100>].
- 2020 **L.F.**, L.Righi, F. Spinozzi: “*AUGUSTO RIGHI. Catturare l'invisibile, Anticipare il futuro*”, Morellini ed., Milano, 2020, ISBN: 978-88-6298-811-7.
- >2020 National Prize for Scientific Dissemination (Dosi Award) – **National Jury**.
- >2018 National Prize for Scientific Dissemination (Asimov Award) - **Scientific Board**.
- >2017 European Research Night, **responsible** for public stand.
- >2017 Summer School “*Officina-Laboratorio*”, guidance activity to choose a degree programme (60 h/y), **responsible**.
- >2017 “ATLAS Open Data”, guidance activity to choose a degree programme (30 h/y), **tutor**.
- 2019 **Speaker**: “*Infinitamente grande, infinitamente piccolo. L’esperienza ATLAS presso il CERN di Ginevra*”, organized by Associazione Astronomica del Rubicone.
- 2018 Public discussion about the film: “Il Senso della Bellezza”, Cinema Tiberio (~ 200 people), **speaker**.

### Other activities

**ICHEP 2022** International conference, Bologna, 6-13 July 2022 (LOC)

LHCP 2018 International conference, Bologna, 4-9 June 2018 (LOC)

Referee for NIM and EPJC scientific journal (2020 acknowledged as distinguished EPJ referees)

Referee of research proposals for MIUR: Rientro dei Cervelli, VQR and FARE;

Chair of the “Standard Model Physics” session during the 102nd Congress of the Italian Physics Society, held in Padua in September 2016.

### ATLAS activities

#### *Recent activities*

Physics analysis: as a co-supervisor of 1 PhD students on the search for the Higgs boson produced in association with a vector boson and decaying into a pair of b quarks, in the channel where the Z boson decays to a pair of charged leptons. The work was focused mostly on background studies and performing the analysis, which led to a first direct evidence for the coupling of the Higgs boson to b quarks. [[Phys. Lett. B 786 \(2018\) 59](#), [JHEP 05 \(2019\) 141](#)]

#### **Vector bosons cross-section**

**Responsible** for the luminosity determination by  $Z \rightarrow \mu\mu$  events with RUN1 data. The results were used for comparison with LHC and CMS values. [[Eur. Phys. J. C 71 \(2011\) 1630](#)]

**Responsible** for the  $Z \rightarrow \mu\mu$  channel in the first 13 TeV measurement of the inclusive cross-section of the vector bosons W and Z and their ratio [[Phys. Lett. B 759 \(2016\) 601](#)].

Study of production of vector bosons in association with jets distinguishing between jets coming from the hadronisation of heavy quarks. Co-responsible for the Z channel with RUN2

data. **Co-supervisor** of 1 PhD thesis awarded by INFN as the best PhD thesis in 2019 (“Premio Conversi”) [[JHEP 07 \(2020\) 44](#)].

## LUCID Detector

**Responsible** for Monte Carlo simulation and analysis of the data collected in the numerous beam tests.

**Co-responsible** for algorithms validation that, implemented directly on the frontend board, provide both instantaneous and integrated luminosity measurement.

**Responsible** for detector calibration.

Results have been presented by myself at four international conferences and workshops. I’m author of more than 100 talks, mostly presented in meetings of the LUCID Detector,

Luminosity Task Force and Standard Model working group (in particular in the W/Z sub group)

## Previous or non-ATLAS Activities

Search for exotic states in proton-antiproton annihilation at rest (OBELIX)

- First direct evidence of a gluonic-state candidate [PDG C. Patrignani Chin. Phys. C, 40, 100001].

Dynamical selection rules in proton-antiproton annihilation (OBELIX).

- PhD Thesis [M.Bargiotti et al. (OBELIX Collaboration) EPJ C 35 (2004) 177-187]

B Physics

- Measurement of the bb production cross section in pN at 920 GeV (HERA-B)
- Study of sensitivity to  $\gamma$  angle of the CKM-matrix with  $B_{d/s}$  decay into two mesons (LHCb) . Presented by myself at the International Conference “Physic at LHC”, 13-17 July 2004, Wien.
- Development of the b-tagging algorithms (LHCb).

Luminosity Measurements (HERA-B)

- Development of a new method for luminosity measurement based on the determination of the average number of interactions per bunch crossing [I.Abt et al. (HERA-B Collaboration) NIM.A 582 (2007) 401-412].

Research and Development on Detector (SLIM5, VIPIX, SUPERB, SHiP, ELOFLEX)

- **Data acquisition** and **analysis** during the beam test campaigns on a thin silicon tracker developed inside the SLIM5 collaboration. Presented by myself at “Frontier Detectors for Frontier Physics” - 11th Pisa Meeting on Advantage Detectors, 24-30 May 2009, La Biodola (Isola d’Elba);
- **Data acquisition** and **analysis** during the beam test campaigns on a thin silicon tracker based on vertically integrated technologies developed inside the VIPIX collaboration. Presented by myself at “Frontier Detectors for Frontier Physics” - 12th Pisa Meeting on Advantage Detectors, 20-26 May 2012, La Biodola (Isola d’Elba);
- **Development** of the prototype of the vertex detector for the SUPERB experiment, in synergy with the VIPIX collaboration;
- Study, via **Monte Carlo simulation**, of the Electromagnetic Calorimeter for the SHiP detector, to be installed at the CERN North Area . Talk at “Light Dark Matter 2017”, 24-28 May 2017, La Biodola (Isola d’Elba);
- **Development** of a thin and flexible organic sensor for detection of X, gamma and hadronic radiation (ELOFLEX, Jan 2018).

## Scientific Output

[source: ISI/Web Of Science - ResearchID H-3442-2012 or ORCID 0000-0002-4002-8353]

1000+ papers on refereed journals

50500+ citations (average citations per item: 47.6)

h-index: 102

13 contributions as speaker to national and international conferences

### Teaching Activities

#### PhD:

- > 2018 Member of the Faculty Staff of PhD School (“Collegio dei docenti di Dottorato”) in Science and Technologies for Cultural Heritage (STECH) in Ravenna.
- 2018 Lecturer of the course “Electroweak measurement at LHC”

#### Bachelor:

- >2019 Advanced professional and research skills in physical sciences (LM-Physics)
- >2019 Transversal skills for physics-related professions (LM-Physics)
- >2019 General Physics – Mechanics, Thermodynamics, Electromagnetism (Aerospace and Mechanical Engineering – UniBo, Campus of Forlì)
- 2015-2018 General Physics - Mechanics (Building Engineering – UniBo, Campus of Ravenna)
- 2013-2015 General Physics Module – Wave-Motion Phenomena (Electronics and Telecommunications Engineering)
- 2011-2013 General Physics - Mechanics (Civil Engineering and Computer Engineering)
- 2008-2009 General Physics Module - Thermodynamics (Mechanical Engineering)

### Students supervision

- 2 PhD co-supervision in ATLAS
  - “Inclusive Z boson production and in association with b-jets in proton-proton collisions at 13 TeV with the ATLAS experiment.”
  - “Measurement of the Standard Model Higgs boson produced in association with a Z-boson and decaying into a pair of b-quarks in Run 2 data with ATLAS”
- 2 master students in Physics
  - **“Le immagini dei testi didattici di fisica delle scuole superiori: un’analisi di genere”**
  - “Ruolo dei laboratori nella didattica e nella ricerca: da Galilei a Righi fino ad oggi”
- 3 bachelor students in Physics
- 3 bachelor students in Energy Engineering

# LASAGNI MANGHI FEDERICO

29/09/2021

## SCIENTIFIC SUMMARY

### DETECTOR ACTIVITY

LUCID - ATLAS Luminosity detector

- *Activities* - Firmware, software, DCS development and maintenance

- *Responsibilities* - Responsabile Attività ATLAS Italia, Run Coordination, TDAQ expert, DCS Coordinator, Luminosity Operation Manager/Run Coordinator.

- 4 Conferences

- 4 Articles

ATLAS Muon detector (BIS78) - Upgrade RUN3

- *Activities* - TDAQ software development and hardware integration

- *Responsibilities* - BIS78 DAQ responsible

- 1 Conference

### ANALYSIS ACTIVITY

ttH associated production at LHC

- *Activities* - Software development for background estimation, analysis of 2012, 2015 and 2016 data.

- 2 Conferences

- 4 Articles

Z → μμ at the LHC

- *Activities* - Analysis for cross section measurement and luminosity measurement

- 2 Conferences

- 1 Article

### SIMULATION ACTIVITY

Fast digitization for ATLAS and ITk

- *Activities* - Software development for fast chain simulation and ITk performance using CMOS detectors

- 1 Conference

- 1 Article

### TRIGGER ACTIVITY

Fast Tracker, FWD & MinBias trigger

- *Responsibilities*: MBFD Trigger coordinator

- *Activities* - Software development, electronic hardware and firmware testing

- 1 Conference

- 3 Articles

### TEACHING ACTIVITY

*Fisica generale II* tutoring for civil engineers, 2017-2018

*Fenomeni termici* tutoring to physicists, 2017-2018

Birth and contacts:

flasagni@cern.ch, lasagni@bo.infn.it

### ACADEMIC STUDIES

- B. Sc. & M. Sc. at the University of Bologna

- Ph. D. at the University of Bologna

### CAREER

- Postdoctoral position in Bologna

- Permanent research position at INFN Bologna

### GRANTS

- Simil-Fellow grant, with INFN and CERN

- Marco Polo grants with University of Bologna

- Funded PhD at the University of Bologna

### QUALIFICATIONS

- Qualified at the INFN national selection, "Bando 18221 / 2016"

### OUTREACH

- *Scienza in Piazza* guide 2013 and 2015

- *Orientamento universitario* Reggio Emilia, 2017, 2018, 2019

- ATLAS Italia outreach group

- Q&A at *Il Senso della Bellezza*

projection, Reggio Emilia, 2018

- Writer for *Libro Aperto* periodic

### IT & LANGUAGES

Very high C/C++ expertise, good knowledge of VHDL, LabView, Python, WinCC OA

Extensive use of ROOT

English: *Excellent knowledge*, First Certificate in English, mark A, C1 (2007)

French: *Good knowledge*, DELF/DALF certificate in French, B1 (2007)

# Career and Research Activity

Since the beginning of my scientific career, I have been involved in both analysis activities and experiment preparation in the Bologna ATLAS group. This was carried on both in Bologna and at CERN.

In the Bachelor thesis I stated my work on the ATLAS experiment, with the measurement of the  $Z \rightarrow \mu^- \mu^+$  cross-section. For the Master I moved to the development of the Fast Tracker prototype Vertical Slice. Soon after, I started the Ph.D. by testing the prototype using the p-Pb 2013 collisions, I then moved to the study of luminosity systematics using  $Z \rightarrow \mu^- \mu^+$ , contributing to the corrections that were later applied to the official numbers. On the detector side I wrote the firmware for the LUCID luminosity monitor upgrade and supervised the detector installation at the beginning of the ATLAS Run 2. The main topic of my Ph.D. thesis consisted in providing background estimations in the ttH multilepton analysis using advanced techniques that have strongly influenced the main ones used in the 2016 data analysis, that led to the first evidence paper.

In December 2016, after the end of the Ph.D. I have passed the INFN hiring eligibility national test, but did not make the hiring list.

On March, 1st, 2017 I won a post-doc position in Bologna for the duration of 2 years, with the title "Maintenance and development of data acquisition systems for the ATLAS experiment". Starting from the months of May I have been LUCID Run coordinator at CERN and have covered the TDAQ Expert and DCS Responsible roles often since then. I have at the same time started two upgrade activities: simulation of the impact of CMOS sensors in the Inner Tracker HL-LHC upgrade and TDAQ development for the LHC Phase 1 upgrade of the muon detector. The advancements I developed in the Fast Digitization techniques for the Inner Detector are now part of the main ATLAS Fast Chain Simulation.

Just after I had obtained a new INFN post-doc position in Bologna, I won a permanent research position at the INFN national selection, Bando 2012 / 2018, becoming a "Ricercatore di III° Livello". Since then I have continued working on the LUCID detector upgrade for Run 3 and on the BIS78 Detector and have been appointed Forward Detector and Minimum Bias trigger coordinator (ended October 2020).

Since 2020 I am the responsible for the LUCID Detector in ATLAS Italia. In the last year, in addition to developing the new DCS infrastructure for Run 3 LUCID, I have been leading the investigation of the radiation hardness properties of the LUCID fibre detector. On this topic I have acted as supervisor in the Master Thesis "LUCID fibre detector characterization" during which a test system comprising radiation hard fibers, test LED's and sensors, power distribution and acquisition electronics was developed. This test system was irradiated at the gamma facility ENEA Calliope.

Bologna, 29/09/2021

Federico Lasagni Manghi



## Curriculum Vitae del Dott. Travaglini Riccardo

Ho conseguito la laurea in Fisica nel 1998 e il dottorato di ricerca in Fisica nel 2004. Ho svolto la mia attività di ricerca tecnologica e scientifica nel campo della Fisica Subnucleare Sperimentale, occupandomi in particolare delle attività di progettazione, sviluppo, verifica e produzione di sistemi di elettronica.

Dal 15/11/2008 sono stato assunto con contratto di lavoro a tempo determinato come tecnologo di III livello presso la Sezione INFN di Bologna e in seguito a concorso nazionale, sono stato assunto il 1/02/2010 a tempo. Indeterminato con la qualifica di tecnologo di III livello, afferente al Servizio di Elettronica della Sezione di Bologna

Dal 1/09/2017 sono responsabile del Servizio di Elettronica della Sezione di Bologna, a cui afferiscono 13 persone.

### *Attività tecnologico-sperimentale*

Ho collaborato con i seguenti esperimenti, occupandomi di progettazione, produzione, test, commissioning e maintenance di dispositivi elettronici, principalmente per i sistemi di trigger e acquisizione dati dei rivelatori stessi.

Mi sono principalmente occupato di dispositivi progettati per i sistemi di trigger e di acquisizione dati degli esperimenti occupandomi, più in dettaglio di:

- progettazione di dispositivi elettronici di tipo programmabile (FPGA) e di System-On-Chip su FPGA basati su processori embedded;
- progettazione dell'hardware e del software real-time per sistemi di test per la verifica delle funzionalità di prototipi di dispositivi elettronici e la verifica di qualità dei lotti di produzione;
- progettazione, implementazione e test di tecnologie elettroniche sui dispositivi sviluppati;
- preparazione e partecipazione a test di dispositivi elettronici ed analisi dei dati acquisiti, in particolare per test di tolleranza alla radiazione, test su fascio e test dedicati di affidabilità (es: burn-in).

Correntemente svolgo attività di relazione del lavoro all'interno degli esperimenti e presentazione dei risultati a conferenze internazionali.

Di seguito alcune collaborazioni.

2008 - oggi: Attività per l'esperimento ATLAS a LHC nella progettazione della scheda ROD per il sistema di acquisizione del rivelatore a Pixel.

1999 - oggi: Attività per l'esperimento CMS a LHC nella progettazione di dispositivi per il trigger di primo livello basato sulle camere a drift-tubes e nell'implementazione su FPGA di algoritmi di machine learning per il sistema di trigger stesso.

2016 - oggi: Attività per l'esperimento FAMU nella progettazione di schede di conversione analogico-digitale per il rivelatore di fotoni X e nell'elaborazione in real-time dei segnali.

Sono autore di oltre 500 pubblicazioni.

*Formazione accademica:*

11/12/1998: laurea in Fisica (nel profilo Subnucleare) presentando una tesi dal titolo "Trigger per eventi con due muoni prodotti nel decadimento di bosoni di Higgs nel rivelatore CMS" presso l'Università di Bologna (relatore Prof.A.M.Rossi);

24/05/2004: dottorato di ricerca in Fisica presentando il lavoro di tesi conclusivo dal titolo "Design and Test-Experiment of the Trigger Electronics for the Muon Drift Tube Chambers of the CMS Detector at LHC" presso l'Università di Bologna (relatore Prof.A.M.Rossi);

2004 - 2008: titolare di assegno di ricerca per lo svolgimento di attività di collaborazione al progetto "Algoritmi per il trigger muonico ed il trattamento dei dati dell'esperimento CMS ad LHC" presso il Dipartimento di Fisica dell'Università di Bologna (supervisore Dott. G.M. Dallavalle)

*Attività formative e di servizio:*

Mi occupo di formazione per studenti (co-relatore di tesi di laurea) e per il personale INFN (responsabile e docente di corsi di formazione).

Ho partecipato a commissioni locali di concorso INFN e a commissioni di gare locali per acquisti di beni superiori a 40 mila euro.

Dal 20/07/2017 sono anche Responsabile Unico della Procedura (RUP) per gli acquisti di elettronica per la Sezione di Bologna. Dal 1/10/2018 sono Direttore dell'Esecuzione del Contratto (DEC) per la Sezione di Bologna in merito agli accordi quadro stipulati da INFN con le ditte RS, ABC tools e Caen per la fornitura di strumenti e materiali elettronici e di ricerca.

Ho partecipato a più di 25 corsi di formazione su tematiche di elettronica, rilevatori di particelle, programmazione, project management e formazione manageriale.

Dal 27/11/2015 afferisco a INFN TTLab, Laboratorio Accreditato per il Trasferimento Tecnologico dell'INFN in Emilia Romagna, nel Reparto Meccatronica ed Elettronica.

Bologna 7/07/2021

Firma

