

University Academic Curriculum Vitae

Personal information

Name: **FEDERICO CORNI**
ORCID: **0000-0003-1226-1585**

Education since leaving school

Year and title of degree; (and university)

1986. Laurea with LODE in Physics (Vecchio Ordinamento) at the Università degli Studi di Modena. Title of the thesis: “Spettroscopia EXAFS con luce di sincrotrone: applicazione all'indagine dell'ordine atomico locale in film Cu-Au interdificati termicamente” (EXAFS spectroscopy with synchrotron radiation: application to the investigation of local atomic order in thermally interdiffused Cu-Au films), supervisor: prof. G.M. Antonini.

Year, subject area and title of Habilitation

2018. Abilitazione Scientifica Nazionale (National Scientific Qualification) (bando D.D. 1532/2016) for full professor (professore di prima fascia) from 10/4/2018 to 10/4/2024, S.C. 02/D1-FIS/08 Fisica Applicata, Didattica e Storia della Fisica.

Advanced courses:

- 1986/87. Corso annuale di perfezionamento in “Metodologia della ricerca di Laboratorio” (Annual advanced course in “Methodology of laboratory research”) at Dipartimento di Fisica of the Università di Modena (director: Maurizio Pellegrini)

Schools:

- 2-10/5/1985. Scuola Sperimentale “Tecniche per l'uso della radiazione di sincrotrone” (Experimental School “Techniques for the use of synchrotron radiation”) at National Frascati Labs (director: prof. Mario Piacentini);
- 14/9-1/10/1985. 30th. Scottish Universities Summer School in Physics “Synchrotron radiation, sources and applications” Aberdeen University (GB) (director: G.W. Marr)
- 1-13/7/1991. International School of Materials Science and Technology, 22nd course: “Semiconductor materials and processing technologies: the role of phase transition, defects and diffusion” at Centro E. Majorana in Erice (director: John Poate and Emanuele Rimini);

Present appointment

Title of appointment, start of appointment, level of appointment (in national / international context), employer (University, research institute, status of university / institute)

- **Professore Ordinario** (Full professor) from 1/2/2019.
 Faculty of Education
 Free University of Bozen-Bolzano
 SSD FIS/08 Didattica e Storia della Fisica
 SC 02/D1 Fisica Applicata, Didattica e Storia della Fisica

Professional experience

Chronological list of all previous employments (each with job title, starting and finishing dates, level, employer, responsibilities)

From / to	Job title	Name of academic Institution	Academic level	Responsibilities
31/12/2012-31/1/2019	University Professor	Università di Modena e Reggio Emilia	Associate Professor	Courses, research programs, and academic responsibilities
1/7/95 – 30/12/02	University Researcher	Università di Modena e Reggio Emilia	Ricercatore Universitario B01 – Fisica Generale e Complementi	RBS and Nuclear Techniques; Design and development of the Thermal Desorption Laboratory and the Time Resolved Reflectivity Laboratory of the MASESM Laboratory - Materiali Avanzati per Sistemi μ -Elettro-Meccanici
16/9/1988 – 30/6/1995	Graduate technician of Vacuum	Università di Modena	Funzionario Tecnico VIII qualifica funzionale dell'area tecnico scientifica e socio sanitaria	Ion Implantation Laboratory

Postgraduate supervision (PhD level): number of students supervised in the last 5 years with subject areas:

Supervision of 3 PhD students

Teacher training course in the last 3 years:

- From school year 2009-10 to 2018-19 several public schools in the Province of Modena
Little scientists in the lab. Stories, experiments and models for science education and training in primary school
Responsible and coordinator of training activities for in-service primary school teachers
- From school year 2011-2012 to 2018-19 – MEMO Multicentro Educativo del Comune di Modena Sergio Neri
The Knowledge of the World: the science approach in kindergarten
Training course for kindergarten teachers (and nursery school in the last 4 years) of the Municipality of Modena
- From year 2017, in various schools in the provinces of Modena and Bolzano
Learning in Depth
as director of the Italian experimentation.

Other academic responsibilities

Internal appointments to faculty and university boards:

- ***Founder and President of the Scientific Committee*** of the Research Center MANIS – Metaphor and Narrative In Science (from foundation in 2017 to present) (see www.manis.unimore.it)

External appointments at national and international level:

- From 1/1/2018 to 31/12/2020: ***Principal Investigator of the European Project: FCHgo - Fuel Cells HydroGen educational model for schools*** (proposal 826246), Horizon 2020 Program (at the stage of grant agreement

preparation). Since 1/2/2019, Federico Corni moved to UNIBZ and become PI of the UNIBZ parter.

- Form 5/9/2018 to present: **member of the Board of Advisors for the Centre For Imagination In Research, Culture, & Education (CIRCE)**, Faculty of Education, Simon Fraser University.
- From 12/2017 to present: **Leader** (with Stamatis Vokos - California Polytechnic State University, San Luis Obispo, USA) **of the GIREP Thematic Group** on Physics Preparation of Teachers in Grades K-6.
- From 12/2017 to present: **Responsible and director of the Italian research program Learning in Depth** (Kieran Egan and Gillian Judson, IERG Imaginative Education Reserach Group, Simon Fraser University, Vancouver, Canada)
- From 2008 to present: **Scientific responsible of the Fisica in Moto Didactic Laboratory** of Ducati Foundation.
- Form 18/6/2014 to 15/9/2014: **Appointment for evaluation studies of the Piani di Studio della Scuola dell'Obbligo Ticinese**, given by the Repubblica del Canton Ticino, Dipartimento dell'Educazione della cultura e dello sport, Divisione della Scuola, Gruppo operativo Harnos - Bellinzona – Svizzera.
- From 11/4/2012 to 31/7/2012: **Expert consultant of MIUR Italian Ministry of Instruction, University and Research** for studies of revision of the **National Guidelines for the Curriculum of Kindergarten and First Instruction Cycle (Indicazioni Nazionali per il curricolo della scuola dell'infanzia e del primo ciclo di istruzione)** (see the list of experts published at p.2 of the final official document) – part of science.
- From 19/5/2006 to 14/12/2007: **Member of the committee of the Sovrintendenza Scolastica di Bolzano** for **writing the Learning Specific Objectives (Obiettivi Specifici di Apprendimento) for math, science and technology.**
- **External participation as collaborator of the Univeristy of Udine to the MIUR PRIN Research Program of National Interest 2004-2007:** “Percorsi di Formazione in Fisica per il 21° Secolo” (Training paths in Physics for the 21st Century), scientific responsible prof. Marisa Michelini, scientific coordinator: prof. Paolo Guidoni.
- **Participation as member of the University of Udine to the MIUR PRIN Research Program of National Interest 2001-2004:** “L'educazione scientifica di base e le basi culturali della meccanica quantistica: due sfide nella formazione dell'insegnante” (Basic science

education and the cultural bases of quantum mechanics: two challenges in teacher training), scientific responsible prof. Marisa Michelini, scientific coordinator: prof. Paolo Guidoni.

- **Participation as member of the University of Udine to the MIUR PRIN Research Program of National Interest 1999-2001:** “Innovazione didattica e formazione degli insegnanti in campo scientifico: l’impiego delle nuove tecnologie nell’insegnamento scientifico per l’aggiornamento del curriculum e il miglioramento dell’apprendimento” (Teaching innovation and teacher training in science: the use of new technologies in science teaching for curriculum updating and improvement of learning), scientific responsible prof. Marisa Michelini, scientific coordinator: prof. Paolo Guidoni.
- **Referee of several international journals of science education**
- **Referee of various international conferences, e.g. GIREP** – International Research Group of Physics Teaching, and **ESERA** – European Science Education Research Association.

Responsibilities for organizing conferences-seminars-exhibitions (place, duration, institute)

CONFERENCE ORGANIZATION:

- Organization and member of the scientific committee of the International Conference “Education, Earth, Nature” 2017 and 2018
Facoltà di Scienze della Formazione, Libera Università di Bolzano.
- Organization (scientific responsible) of the International Conference “Innovation in Science Education in Primary School and Kindergarten: crossroads between science and humanities”
Università di Modena e Reggio Emilia
01-02-2019 to 02-02-2019
02-12-2016 to 03-12-2016
21-11-2014 to 22-11-2014
30-11-2012 to 01-12-2012
12-11-2010 to 13-11-2010
- Organization of the SIPED Conference 2015
“Permanent Education from early childhood. From Kindergarten to University”

Facoltà di Scienze della Formazione, Libera Università
di Bolzano, Bressanone
From 03-12-2015 to 05/12/2015

EXHIBITIONS:

Member of the scientific committee of the exhibition

“Tutti i colori delle stelle. Padre Angelo Secchi e la nascita dell'astrofisica” (All colours of the stars. Father Angelo Secchi and the birth of astrophysics)

Scientific and didactic collaboration to the development of a laboratory section about light and spectroscopy.

Musei Civici di Reggio Emilia

Form 20/10/2018 to 31/1/2019.

INDUSTRIAL EDUCATIONAL LABORATORIES:

- Scientific and didactic responsibility of the ***Fisica in Moto Laboratory of the Ducati Foundation*** in Borgo Panigale (BO), from the foundation in March 2006 to present: development of the didactic contents and methods, training of the staff for the visits of the schools during the school year, organization of 8 summer schools for secondary school students, organization of 2 secondary school teacher training courses, organization of 1 secondary school deans.
- Collaboration with ***Dallara Group*** in Varano de Melegari (PR), from July 2017 to present, for the design, development and production of didactic experimental station prototypes for the Dallara Motorsport Academy project “Scienza e tecnica da corsa. Progettare la velocità”, and for the development of didactic contents and methods for the schools.
- Collaboration with ***Autostadt (Wolfsburg, Germany) – Volkswagen***, from July 2013 to 2015, for the development of experiments for the didactic laboratory activities offered to German schools.

Memberships

Membership of academic or professional bodies (including membership of Editorial Boards of scientific publications; membership of scientific committees for international conferences)

Member of ***GIREP – International Research Group of Physics Teaching***

Member of **SIF – Italian Physical Society**

Member of **AIF – Italian Association of Physics Teachers**

Founder and President of the Scientific Committee of the **Research Center MANIS – Metaphor and Narrative In Science** (from foundation in 2017 to present) (see www.manis.unimore.it)

Member of the Scientific Committee of the International Conference **Educazione, Terra, Natura** (Education, Earth, Nature), Facoltà di Scienze della Formazione, Libera Università di Bolzano.
29/11/2018-01/12/2018

Member of the Scientific Committee of the International Conference **Educazione, Terra, Natura** (Education, Earth, Nature), Facoltà di Scienze della Formazione, Libera Università di Bolzano.
30/11/2017-02/12/2017

Member of the Inter-regional Program Committee of the **1st Inter-regional Conference on Science and Mathematics Education Research**
American University of Beirut, Beirut, Lebanon
25/11/2016-27/11/2016

Scientific responsible of the biannual International Conferences **Innovazione nella didattica delle scienze nella scuola primaria e dell'infanzia: al crocevia fra discipline scientifiche e umanistiche**
Università di Modena e Reggio Emilia
Edizioni 2010, 2012, 2014, 2016 e 2018

Member of the editorial board of **La Fisica nella Scuola, journal of the Italian Association of Physics Teachers**
From 08-01-1994 to present

Member of the scientific committee of the editorial series **Educazione Terra Natura**
Direttore: Liliana Dozza – Publisher: ZEROSEIUP
From 01-11-2017 to present

Inclusion in the **Banca Dati Esperti del MIUR (Data Base of Experts of MIUR – Italian Ministry of Instruction, University and Research)**, created with decree prot. n. AOODGAI/5071 date 12.10.2009, about the themes concerning the national and international researches for the assessment of young people and adult skills in the

system of instruction and training (INVALSI, OCSE-PISA, OCSE-ALL, IEA-TIMSS and IEA-PIRLS surveys)
(Programmazione Fondi Strutturali 2007/2013- PON
"Competenze per lo Sviluppo" Fondo Sociale Europeo: Asse I –
Capitale Umano - Obiettivo B. Azione B 3 - Interventi di
formazione sulla valutazione nei processi di
apprendimento". Piano nazionale di informazione e
sensibilizzazione sull'indagine OCSE-PISA e altre ricerche
internazionali.)

Associated to the research activities of the **Laboratori Nazionali di Legnaro** of the **Istituto Nazionale di Fisica Nucleare (INFN)** with access too AN2000 e CN accelerators for nuclear analysis techniques (Rutherford Backscattering Spectrometry, Elastic Recoil Detection, Nuclear Reaction Analysis)
From 1997 to 2012

Associated to the research activities of the **Istituto Nazionale di Fisica della Materia (INFN)**
From 2000 to 2005

Research and scholarships

Summary of current research and scholarship

Main topics of research are:

- 1 - Pre-service and in-service teacher training, and curriculum of physics and sciences in kindergarten and primary school
- 2 - Role of metaphor and language
- 3 - Scientific communication and informal learning contexts
- 4 - Analysis techniques, concepts and tools in matter physics
- 5 - Modelling in physics and science education

Publications

Main publications over the last years in chronological order:

• Books – Edited

2020

F. Corni, T. Altiero, A. Landini (Eds.).

Innovazione nella didattica delle scienze nella scuola primaria e dell'infanzia: al crocevia fra discipline scientifiche e umanistiche.
Proceedings 2016. Selected papers.
PADOVA: CLEUP

2015

F. Corni, T. Altiero (Eds.).
Innovazione nella didattica delle scienze nella scuola primaria e dell'infanzia: al crocevia fra discipline scientifiche e umanistiche.
Proceedings 2014. Selected papers.
MANTOVA: Universitas Studiorum
ISBN: 9788899459284

2014

F. Corni, T. Altiero (Eds.).
Innovazione nella didattica delle scienze nella scuola primaria e dell'infanzia: al crocevia fra discipline scientifiche e umanistiche.
Proceedings 2012. Selected papers.
MANTOVA: Universitas Studiorum
ISBN: 9788897683414

2013

F. Corni (Ed.).
Le scienze nella prima educazione - Un approccio narrativo a un curriculum interdisciplinare.
GARDOLO (TN): Edizioni Centro Studi Erickson
ISBN: 9788859004936

2011

F. Corni, C. Mariani, E. Laurenti (Eds.).
Innovazione nella didattica delle scienze nella scuola primaria: al crocevia fra discipline scientifiche e umanistiche. Seminari, aperture, contributi di ricerca, esperienze di pratica didattica.
Proceedings 2010. Selected papers.
MODENA: Artestampa
ISBN: 9788864620916

- **Chapters in books**

2019

A. Landini, E. Giliberti, F. Corni
The Role of Playing in the Representation of the Concept of Energy: A Lab Experience for Future Primary School Teachers.

In E. M. Kampen & P. van Kampen (Eds.): Concepts, Strategies and Models to Enhance Physics Teaching and Learning
p. 125–137

2019

H. U. Fuchs, A. Contini, E. Dumont, A. Landini, F. Corni

How metaphor and narrative interact in stories of forces of nature.

In M. Hanne and A. Kaal (Eds.): Narrative and Metaphor in Education: Look Both Ways.

London, New York: Routledge

ISBN: 9781138310872

- **Journal articles in refereed academic journals (with DOI whenever possible)**

F. Corni, H.U. Fuchs (2020).

Primary Physical Science for Student Teachers at Kindergarten and Primary School Levels: Part I - Foundations of an Imaginative Approach to Physical Science.

INTERCHANGE

doi: 10.1007/s10780-019-09382-0

F. Corni, H.U. Fuchs, A. Landini, E. Giliberti (2019).

Visual and gestural metaphors for introducing energy to student teachers of primary school and kindergarten levels.

JOURNAL OF PHYSICS: Conference Series, 1287, 012043.

doi: 10.1088/1742-6596/1287/1/012043

Scopus: 2-s2.0-85072112479

F. Corni, H.U. Fuchs, E. Dumont (2019).

Conceptual metaphor in physics education: roots of analogy, visual metaphors, and a primary physics course for student teachers.

JOURNAL OF PHYSICS: Conference Series, 1286, 012059.

doi: 10.1088/1742-6596/1286/1/012059

Scopus: 2-s2.0-85072226157

F. Corni, M. Michelini (2018).

A didactic proposal about Rutherford backscattering spectrometry with theoretic, experimental, simulation and application activities.

EUROPEAN JOURNAL OF PHYSICS, vol. 39, p. 1-23

ISSN: 0143-0807

doi: 10.1088/1361-6404/aa9053

Scopus: 2-s2.0-85040354842

F. Corni, H U. Fuchs, G. Savino (2018).

An industrial educational laboratory at Ducati Foundation: narrative approaches to mechanics based upon continuum physics.

INTERNATIONAL JOURNAL OF SCIENCE EDUCATION, vol. 40, p. 243-267

ISSN: 0950-0693

doi: 10.1080/09500693.2017.1407886

Scopus: 2-s2.0-85036544050

A. Ascari, F. Corni, G. Ceroni, H.U. Fuchs (2015).

From naive to scientific understanding of motion and its causes.

IL NUOVO CIMENTO C, vol. 38, p. 1-7

ISSN: 2037-4909

doi: 10.1393/ncc/i2015-15085-2

Scopus: 2-s2.0-84960453722

Further data

Presentations at scientific conferences over past 3 years (invited or selected, keynote, nature and status of conference)

INVITED ORAL PRESENTATIONS:

*Metafora, analogia, narrazione
nella comprensione e nella didattica della fisica*

F. Corni

105° National Conference of the Italian Physical Society, Università di L'Aquila, 23-27/9/2019

*Energia e forze della natura: un percorso didattico
verticale*

F. Corni

International Conference “Educazione, Terra, Natura”, Facoltà di Scienze della Formazione, Libera Università di Bolzano, 29/11-1/12/2018

Mediazione mediatori didattici

M.A. Mariotti, P.G. Rossi (Keynote speech)

G. Bonaiuti, F. Corni (Discussant)

Seminar: “Didattica e saperi disciplinari – Atto II”

Università di Milano Bicocca, 15-16/3/2018

Visual metaphors for Energy. Ergolandia: introdurre l'energia come tema verticale, dall'infanzia alla scuola secondaria di primo grado con la valigia dell'energia
F. Corni, H.U. Fuchs

International Conference “Educazione, Terra, Natura”, Facoltà di Scienze della Formazione, Libera Università di Bolzano, 30/11-2/12/2017

Idrolandia: introdurre concetti scientifici di base con la valigia dell'acqua

F. Corni, E. Giliberti.

International Conference “Educazione, Terra, Natura”, Facoltà di Scienze della Formazione, Libera Università di Bolzano, 30/11-2/12/2017

Metafora concettuale e didattica della fisica

F. Corni

103° National Conference of the Italian Physical Society, Università di Trento, 11-15/9/2017

Entrepreneurship

Spin-offs, patents and entrepreneurship

PATENT 28-04-2009: United States Patent US 7524736

B2 “Process for manufacturing wafers usable in the semiconductor industry”

Giampiero Ottaviani, Federico Corni, Paolo Ferrari, Flavio Francesco Villa

**Language
competence**

Italian language (mother tongue)

English language (level B2)