

## Prof. Andrea Di Cicco - CURRICULUM VITAE

### 0. Personal data

- Italian citizenship, born in Pistoia (Italy), August 15th, 1962.
- Current home address (permanent): Piazza di Villa Fiorelli 8, 00182 Roma (Italy).
- Language skills: Italian, Inglese (fluent), Francese (good).

### 1. Scientific profile

The main research activity in the last 30 years was devoted to the development, interpretation and multi-disciplinary applications of x-ray techniques in studying materials of interest for basic and applied sciences. In the last 15 years he has been engaged in research about matter under extreme or transient conditions and on functional materials for energy applications. Both research lines have been financed at national and international level and scientific results have been published on high-impact journals. He published as main author or co-author more than **200** publications on international journals, cited more than **7000** times in the literature. Current *h*-index is 41 (ISI WoK) or 44 (Google Scholar). He is presently included in the "top italian scientist" list of the Virtual Italian Academy. Invited speaker at several international conferences and referee for many scientific journals. Chairman of the XAFS14 and LAM14 international conferences, he is co-editor of 3 books of proceedings, one EPJ Special Topic issue and 1 book about the advanced GnXAS multiple-scattering method. He has been, several times, invited scientist at SSRL, ESRF, and invited professor at University of Paris-Sud (XI), UPMC (Paris VI, international chair), Rennes. He is currently ex-officio chair of the Italian Synchrotron Radiation Society and he has president of the International X-ray Absorption Society (IXAS). He has been awarded in August 2015 of the "outstanding achievement award" (Stern prize) of the International X-ray Absorption Society IXAS. He is responsible of the Physics Division at the University of Camerino and coordinator of the PhD programs in Physics, Earth Science and Material Science.

Research interests in brief:

- 1 *Condensed matter under extreme conditions: development of experimental techniques using synchrotron radiation for studying liquid metals and glasses;*
- 2 *Determination of the local two-body and three-body distribution in liquids, undercooled liquids and glasses;*
- 3 *Development of advanced data-analysis and simulation methods for x-ray absorption spectroscopy (XAS): multiple-scattering, many-body effects in absorption and photoemission with applications to simple systems (GnXAS and RMC-GnXAS);*

- 4 *Fine data-analysis techniques for systems of fundamental interest for ionic and superionic materials, superconductors, nanophase materials, catalysts and systems of biological interest;*
- 5 *Synchrotron radiation in-situ and ex-situ study of functional materials such as lithium battery electrodes, and of the evolution of the interface with the electrolyte (SEI);*
- 6 *Development of the upgrade of the XAFS@Elettra beamline for combined XAFS and XRD studies aimed to determine the local structure and phase transitions under extreme conditions;*
- 7 *Development of the Timex end-station at the Fermi @ Elettra free electron laser for measurements of condensed matter in extreme and non-equilibrium conditions.*

## **2. Academic-Scientific career (national)**

He graduated with honors (1987) and obtained a PhD (1991) in Physics at the University of Rome "La Sapienza" with a thesis on the x-ray absorption spectroscopy. He then carries out his academic career mainly at the University of Camerino (Unicam) where he obtained first researcher (1990) and then professor (2000) positions, alternating periods of work near prestigious international institutions related to the activity to research at "large scale facilities". Over the years he has held various positions of representation and management both at the university headquarters, including the direction of the Physics section, both at national level, also acting as a member or president of many commissions for comparative assessments of INFN, CNR, and Universities competitions. He also hold others executive positions becoming president of the Italian Synchrotron Radiation Society (SILS).

Chronology in brief:

- since 2019 **Coordinator** of the PhD course in Physics, Earth and Material Sciences at (*Unicam*).
- 2018-2021 member of the ASN evaluation committee in Italy (02/B1).
- since 2018 **Full Professor** nel settore FIS/01 (*Unicam*).
- since 2016 Evaluator ANVUR/VQR.
- since 2015 **President** of the Società Italiana Luce di Sincrotrone (SILS), main organizer and chairman of the meetings SILS 2016 (Bari), 2017 (Trieste), 2018 (Roma), Camerino (2019).
- since 2014 Member of the *Consiglio del sistema Bibliotecario e Museale di ateneo* (*Unicam*).
- 2014-2017 Member of the "School of Advanced Studies" and **coordinator** of the PhD courses in Physics at (*Unicam*).

- 2015-2017 Member of the *Senato Accademico* of the Università di Camerino (*Unicam*).
- 2013-2017 Member of the *Collegio di disciplina di ateneo* (*Unicam*).
- since 2013 Member of the steering committee of the *Scuola di Scienze e Tecnologie* of the Università di Camerino.
- since 2013 **Director** of the Physics Division of *Unicam*. Organizer and chairman of the meeting “30 anni di Fisica a Camerino” (2017).
- 2012 **ASN Full professorship** (SC 02/B1).
- 2010-2014 Responsible for the *internazionalization program CdL Fisica* (*Unicam*).
- 2007-2013 **Scientific consultant** at the Sincrotrone Trieste for the activities of the XAFS (ELETTRA) ed EIS-TIMEX (FEL Fermi) beamlines.
- 2004-2009 Responsible of the *Centro Grandi Apparecchiature di* (*Unicam*).
- 2002-2008 Vice-director of the Physics Department (*Unicam*).
- 2001-2005 Delegate for associate professors at the *Senato accademico Unicam* ;
- 1998-2000 member of the evaluation commission of the GILDA beamline at ESRF (CNR-ESRF).
- 2000-2018 **Associate professor** SSD FIS/03 at (*Unicam*).
- 1997-2004 Member of the steering committee of the *consiglio di gestione del Centro Interdipartimentale Grandi Apparecchiature* (*Unicam*).
- 1997-2004 Member of the commission *biblioteca del Dipartimento di Matematica e Fisica* (*Unicam*).
- 1992-1996 Delegate of researchers RU in the *Senato Accademico integrato*;
- 1989-1999 **Researcher** SSD FIS/03 (*Unicam*).
- 1988-1991 **PhD** in Physics at the Università di Roma La Sapienza (1991).
- 1987 *Graduated with honors* in Physics (Università di Roma La Sapienza).

### **3. Academic-Scientific career (international)**

Chronology in brief:

- since 1986 - Invited talks, experiment proposals, collaborations

He participated for over 35 years at hundreds of conferences, workshops and schools international as a speaker, over 50 times by invitation, leading over 80 sessions of advanced synchrotron-radiation experiments approved and financed by international institutions. He has been invited to give seminars in dozens of international institutions. He carried out important and continued international collaborations with several research groups and institutions in USA (Stanford, Argonne), France (Paris, Orsay, Grenoble, Rennes), Poland (Gdansk, Warsaw), and with other countries and institutions including Germany, U.K., Spain, Japan, China, India.

- since 1991 - *Editorial board and referee activity*

Member since the beginning of the editorial board of Scientific Reports (Nature), co-editor of the online journal XAS research review and referee for more than 25 years of major journals in the fields of Physics of Matter, Material Science and Energy Materials.

- since 1992 - *Chairman in conferences, workshops, schools*

**Chairman and organizer of 2 important international conferences:** XAFS14, 2009, Camerino, *500 participants*; LAM14, Roma La Sapienza, *250 participants*). He organized several other conferences, workshops and schools since 1992 (Italy, France, USA, Japan, Poland, Brasil, Australia). In particular, he has been chairman of the SILS conference in 2016 (Bari), 2017 (Trieste), 2018 (Roma), and 2019 (Camerino). He has been member of the *scientific advisory committee* of two important cycles of conferences (XAFS and LAM, Krakow in 2018, Bonn and Lyon in 2016, 2019 respectively) and more recently of the XTOP conference (Bari, 2018).

- since 2003 - *Invited highlights*

Author of several articles included in the “highlights” of the *European Synchrotron Radiation Facility*, of the *Elettra Synchrotron Light Source* and Synchrotron “Soleil” (Francia). Cover of the journal PCCP (2008) of a high-impact published paper.

- 2006-2018 *Member of evaluation committees*

Member of or consultant to several international evaluation committees for funding (including the *National Science Foundation in the US and ANR in France*) and staffing. From 2014 to 2018 he sits in the scientific evaluation committee of the international synchrotron radiation center Soleil in France.

- 2015 **Outstanding Scientist Award**

Awarding of the top prize (*outstanding scientist award*) of the IXAS international society in 2015 for pioneering studies on disordered systems (followed by interviews, reviews and videos).

- 2003-2012 **President of the IXAS**

Committee member (2003) and *President* (2006-2009) of the International XAS society (now ex-officio).

- 1991-2014 *Invited scientist/professor in foreign institutions*

*Invited scientist/professor* on summer leave 7 times at Stanford (SSRL and Stanford University), 3 times in Paris (Univ. Paris XI, CNRS, UPMC), 2 times in Grenoble, 1 time at University of Rennes.

- 2007-2008 **International Chair**

**International chair** at the University of Paris UPMC (*chaire internationale*

*d'excellence*, professeur 1ere classe qualifié en France) in sabbatical leave. He is a qualified professor in France.

- 2003-2006 Reviews and interviews in international press

Review on Physical Review Focus in 2003 of a high-impact article, then passed on to the national and international press. Interview of the Institute of Physics (IOP) published on the magazine's website (2006).

- 1996 **NATO-CNR Senior fellowship** (Stanford University). He spent one year at Stanford University to develop new XAS data-analysis methods, following several PhD students.

#### 4. Management experience

- 2015-2020 SILS President

**President** of the Italian Synchrotron Radiation Society (SILS), a company (~ 100 associates) whose institutional aim is the promotion and coordination of the activity of the Italian scientists at advanced radiation sources. As a president he has maintained and maintains relations with Italian scientific institutions and with international organizations with the same goals. He has the responsibility of the budget, coordinates a committee of six scientists, relates to auditors and has a technical secretariat of 3 people. An appreciated international school is held every two years and an annual international conference is organized, in which prizes are awarded for researchers who have distinguished themselves in the field.

- Since 2014 Responsible of the Physics Division

As a **director** of the Physics Division of the School of Sciences e Technologies, he manages and directs activities of this structure. This currently consists of in ~ professors researchers (permanent and fixed-term), 5 technicians and a number of research fellows and PhD students of the order of 20 (see also the website <http://fisica.unicam.it>). The Physics Division is located in 2 buildings occupying a total of about 2000 m<sup>2</sup> with offices, laboratories, classrooms and technical services. During the management period the number of students and doctoral students has steadily increased (50%), and highly competitive advanced equipments (high resolution SEM, microRaman, AFM) have been acquired, co-financed with institutional funds. Also, by increasing the number of financed projects (of the order of 1 MEuro / year) the resources were found to activate several RTD contracts (agreements with INFN, European projects, cofinancing). An agreement was made with the CNR for the exchange of researchers. The scientific productivity has been very high, resulting in the ministerial evaluations (VQR 2011-2015) at the top of the university ranking, in absolute prominence in the national field. As part of a shared program among the researchers, particular attention was given to the evaluation

of quality of research and training in the international context, associated with a program of strong interchange with other local departments and institutions and with the industrial system in the area. For this purpose contracts were used for PhD scholarships co-financed by private companies.

- 2007-2013 Sincrotrone Trieste scientific consulting

He has been **scientific consultant** of the Sincrotrone Trieste company with the role of promoting the development of the XAFS synchrotron radiation beamline at Elettra and of realizing an end station (TIMEX) at the free electron laser then under construction (FERMIatElettra), coordinating specific work groups. As a consultant for the XAFS beamline he has conceived and realized together with the beamline managers (L. Olivi e subsequently G. Aquilanti) and technicians (N. Novello) a substantial "upgrade" of the beamline itself, both in terms of software and instrumental control. A paper published in 2009 and highly cited in literature summarizes some of the innovations carried out by the working group. The TIMEX end station was created in collaboration with the EIS beamline team (Elastic and Inelastic Scattering), thanks to the collaboration of various researchers (A. Trapananti, F. D'Amico, E. Principi, E. Giangrisostomi) from Unicam and others from Sincrotrone Trieste (F. Bencivenga, R. Cucini, C. Masciovecchio). The measurements performed at TIMEX have been among the first published by the Italian free electron laser, and they are cited in the specific literature.

- 2006-2009 President of the IXAS

**President** of the International XAS society (IXAS), of which he is now past president. The IXAS is a company classified as an "international Non Profit Organization (NPO)" which brings together over 1000 scientists who develop or practice the X-ray absorption spectroscopy. During the presidency the company organized the international conferences of the sector promoting the activity of various commissions (Standards and Criteria) also in collaboration with the IUCr. Important international awards were conferred to prestigious scientists. During the period the number of members has been doubled, the articles of association and the name itself of the society changed, reconfiguring the organizational part and the website. A national scientific committee has been created with secretariat and managerial autonomy to organize the main events on the Italian territory. The official website was: <http://www.ixasportal.net>.

## 5. Management and coordination of personnel and research groups

- XAS research group (since 1995)

As a university researcher (1990-1999) he founded his own research group (XAS group) overseeing the first fellows (S. K. Pandey, M. Rosolen, F. Sperandini, M.

Minicucci), undergraduates and PhD students (L. Comez) and building the XAS laboratory at the Department of Physics, which becomes known internationally as a dissemination center for the analysis and understanding of X-ray absorption spectroscopy. The XAS web site is created <http://gnxas.unicam.it>, active since 1995, which has accumulated thousands of contacts and is a recognized GnXAS dissemination center (method and software for XAS spectroscopy used by dozens of research groups). The group strengthened in the following years (2000-2010) with the recruitment of M. Minicucci (technologist), the arrival of INFN researchers (S. De Panfilis, G. Pratesi), research grants MIUR, CNR and INFN (R. Natali, E. Principi) and PhD research students (E. Principi, A. Trapananti, G. Greco, F. Coppari) funded by INFN e CNISM. Several researchers and PhD students are also present for prolonged periods foreign institutions (J. Rybicki, A. Witkowska, K. Hatada). The group is structured around the two fundamental lines of research, and is central to the organization of conferences, schools, international workshops as well as manage equipments and carry forward scientific research. Various doctoral students, research fellows and fixed-term researchers were then recruited thanks to funded projects (SIRBATT, TIMEX, Doctoral agreements with CNR, Sincrotrone Soleil, Sincrotrone Trieste), among them E. Principi, A. Trapananti, K. Hatada (later Marie-Curie fellow and professor), E. Giangrisostomi, F. Iesari, L. Properzi, J. Rezvani, M. Ciambezi, E. Yimiti. The excellent preparation of the members of the group is also indicated by the work success and by the general appreciation achieved at international level.

- **Physics Division since 2014**

After having long been deputy director of the Department and then in charge of the large-equipment center (with 3 technicians to supervise) for many years, he assumed responsibility for the Physics Division (Unicam) in 2014. In this quality, he directly manages 5 technical personnel (M. Minicucci, R. Natali, A. Saltarelli, T. Gabrielli, F. Bizzarri) as well as the concierge. In the management of human resources, particular attention has been given to the enhancement of skills, seeking to achieve a team spirit in order to obtain excellent results. In this way, 3 graduate technicians were placed as managers of as many advanced laboratories (low temperatures, materials science, nuclear physics), while the other 2 were dedicated to the electronics laboratory and the workshop. The laboratories have significantly increased their impact in basic and applied interdisciplinary research, in advanced teaching (TFA) also beginning new duties for third parties and for technology transfer. Personnel involvement in research and advanced teaching activities has grown significantly. Personnel management was characterized by active cooperations and confrontations with the various components according to criteria of transparency and respect, which led to a climate of broad and serene collaboration.

## 6. Funding and management of research project funds

Throughout his career he has obtained and managed numerous grants, research contracts and agreements.

### 2017-2020 PRIN NewLi

He is responsible of the Unicam unit within the national PRIN project Newli (NEW Light on transient states in condensed matter by advanced photon - electron spectroscopies) which sees the participation of several universities and CNR and with a dedicated budget for Unicam of around 100 kEuro.

### 2013-2016 SIRBATT

Italian responsible of the *FP7 European project SIRBATT* (Stable Interfaces for Rechargeable Batteries), a European project that saw the participation of 12 partners between Universities, research centers and Companies. With a total value of around 3 MEuro (more than 360 kEuro at Unicam), it has generated several publications with high scientific impact in the field of functional materials science (sustainable energy), patents and prototypes.

### 2008-2012 TIMEX

Proponent and responsible of the *project TIMEX* (2008-2012, an end-station for ultra-fast Time-resolved studies of Matter under EXtreme and metastable conditions) funded with 310 kEuro, for the development and construction of the TIMEX end-station (EIS beamline) at the new free-electron laser Fermi @ Elettra. The station was developed ("commissioning") and used in its initial phase, generating various scientific publications with good scientific impact. In particular, the phenomena of "saturable absorption" in the EUV / soft x-ray region and of transient generation of "warm dense matter" have been studied.

### 1994-2007 Summary of funded projects

In the years prior to 2008 he obtained and managed different projects at the University of Camerino, including a PRIN project (2007, 52.3 kEuro at Unicam), the FISR NUME (co-management with Prof. Marassi, head of the project B. Scrosati, budget 6.2 MEuro, 2004-2008). He has obtained and managed funds for the PAIS HPIT project of the INFN (2002-2005, 152 kEuro), and for the PAIS INFN FLUMET (1998-2000, 41 ML at Unicam), and various projects of the INFN and CNR before from 1990 to 1998 (for a total of about 150 ML).

### 1994-2018 Grants and co-financed staff, support from Large Scale Facilities

A large number of scholarships, doctorates financed and co-financed, research grants, researcher positions at CNR, INFN, CNISM and Sincrotrone Trieste with registered office (total value over 500 kEuro) have been obtained and funded since 1995. He has also stipulated agreements for the funding of a doctoral grant from the University of UPMC in Paris (2007), the co-financing of another 2 from the

synchrotron Soleil (2012 and 2016), and a further one within the PiK project for the XFEL free electron laser. Finally, in more than 30 years of activity, over 80 access projects with financial support have been approved at international synchrotron radiation centers.

## 7. Teaching and "mentoring" activities

The teaching activity has been ongoing since 1990, receiving excellent reviews by students, and covered the following courses:

- 1) Advanced Physics Laboratory (2010-2021) in English
- 2) Solid State Physics (2010-2021) in English
- 3) Termodinamica e fluidi (2010-2021) in Italian
- 4) Physics of Disordered Systems (2010-2012) in English
- 5) Fisica dei Solidi (2001-2009) in Italian
- 6) Fisica Moderna (2007-2009) in Italian
- 7) Laboratorio di Fisica della Materia (1998-2009) in Italian
- 8) Fisica dei Sistemi disordinati (1996-2009) in Italian
- 9) Fisica Sperimentale I (Geologia) (1994-98) in Italian.

As an assistant professor:

- 1) Fisica dello Stato Solido (1992-93) in Italian
- 2) Fisica Generale I (1991-1995) in Italian
- 3) Fisica Generale II (1991-92) in Italian
- 4) Esperimentazioni di Fisica I (1989-1991) in Italian.

Equally important was the **thesis supervisor and "mentoring"** activity which took the form of following directly beyond **40 graduates** (Degree, LM, LT) and beyond **12 PhD students**. Other doctoral students have been followed directly at Stanford University (1992-1998) and at the UPMC (Paris, 2007-2012).

It is also important to note that many students and scholarship holders have also had a remarkable **working success**: L. Comez (ric. CNR-IOM, Perugia), G. Aquilanti (beamline scientist in Elettra, Trieste), A. Trapananti (researcher CNR-IOM, Perugia), E. Principi (beamline scientist at Fermi @ Elettra, Trieste), F. Coppari (researcher at Livermore labs LLNL, USA), E. Giangrisostomi and G. Greco (scientist presso Bessy, Berlin). Other students have distinguished themselves in different fields (for example F. Sperandini founding a high-tech company).

Several **advanced national and international courses** were also organized by invitation or organized for PhD schools or specialization courses: S. Margherita di Pula (1997), Naples (1999), Trieste (2000, 2002), Beijing (2001, 2004), Paris UPMC (2007-2010), Grenoble (2008), Otranto (2014), Muggia (2017), Muggia (2109). He was also organizer and principal speaker of courses in X-ray spectroscopy, attended

by dozens of students and researchers, in Camerino (1992, 1996, 2009), Grenoble (2006), Paris (2007), Saclay (2008), Paris (2010), Melbourne (2011), Univ. Sao Paulo (2013), Karlsruhe (2015), Krakow (2018), Les Houches (2021).

### **Links to personal internet pages**

- Personal webpage: <http://gnxas.unicam.it/~dicicco>.
- Research group: <http://gnxas.unicam.it>.
- Publications (google scholar web page):  
<http://scholar.google.com/citations?hl=en&user=-fJdPiIAAAAJ>
- Researchgate web page:  
[https://www.researchgate.net/profile/Andrea\\_Cicco?ev=hdr\\_xprf](https://www.researchgate.net/profile/Andrea_Cicco?ev=hdr_xprf)

### **Current address and professional position**

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Andrea Di Cicco

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