



Curriculum Vitae

Andrea Bulgarelli

PERSONAL INFORMATION

Andrea Bulgarelli

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Orcid: 0000-0001-6347-0649

Sex Male | Date of birth 24/08/1971 | Nationality Italian

WORK EXPERIENCE

2024

Dirigente Tecnologo
INAF/OAS Bologna

2020-2023

Primo Tecnologo (First Technologist) (since Aug 2020)
INAF/OAS Bologna

2010-2020

Tecnologo (Mar 2010 - Aug 2020)
INAF/IASF Bologna

2005-2010

Tecnologo TD (Nov 2005 - Feb 2010)
INAF/IASF Bologna

2001-2005

Research fellow (2001-2005)
CNR/TESRE

Coordinamento/Responsabilità tecniche e gestionali di progetto

2024

CTA+/PNRR member of the Project Office for software

2020-now

Deputy Software Coordinator of the ASTRI Mini-Array project. The *ASTRI Mini-Array Software System* manages the entire observing cycle of the observatory, from observing projects to observation handling, remote array control and monitoring, data acquisition, archiving, processing and simulations of the Cherenkov and Intensity Interferometry observations, including science tools. Responsibilities:

- Management responsibilities:
 - the organisation of the project (WBS, PBS);
 - project planning and control;
 - team coordination of 46 members;
- Technical responsibilities:
 - Definition of the software requirement, architecture, data model, and computing model;
 - definition of the interfaces

Software Coordinator of the Supervisory Control and Data Acquisition (SCADA) of the ASTRI Mini-Array project. SCADA controls the ASTRI Mini-Array hardware system and all operations at the Array Observing Site. It executes the short-term observation plan to perform observations in an automated way. It acquires scientific data, logging, monitoring, alarm, and online observation quality information to help assess data quality during the acquisition. An Operator can supervise and control the system remotely. Responsibilities:

- Management responsibilities:
 - the organisation of the project (WBS, PBS);
 - project planning and control;
 - risk management;
 - team coordination: coordination of geographically distributed software development teams: about 25 members from INAF, 3 members from the University of Geneva (Switzerland), 5 members from Advanced Center for Electrical and Electronic Engineering (AC3E) at Federico Santa María Technical University Chile;
 - staffing: member of the AC3E selection committee of the software team;
- Administrative responsibility: preparation of “capitolato tecnico” and applicable documents for public tenders for the development of the SCADA system and Director of the Execution of the Contract (DEC) of an industrial contract between INAF and Universidad Técnica Federico Santa María for €. 690.000,00 for the SCADA system.
- Technical responsibilities:
 - definition of the software requirement and architecture;
 - definition of the interfaces;
 - managing the entire software development lifecycle of the project, from planning to delivery compliant with ESA/ECSS E40 standard;
 - deployment and release of the software to the ASTRI project.

Interface Manager of the ASTRI Mini-Array project. This role involves managing interfaces between different systems of the project.

2021-now

Member of the ASTRI Mini-Array Software Engineering team with the technical responsibility of Requirement and Architecture Management.

2020-2023

Software Coordinator of the GAMMA-FLASH project: definition of software requirements and software management processes, coordination of software development team (5 members).

2016-2018

Coordinator of the CTA Observatory Top Level Use Cases workgroup (about 60 members) for the definition of the workflow, operations and functionalities of the entire CTA Observatory, in collaboration with the CTA Project Office. Roles:

- Scientific responsibilities: definition of the workflow of the CTA Observatory
- Management responsibilities: team management for the coordination of the scientific team.
- Technical responsibilities:
 - Development of the CTA Top-Level Use Cases for the definition of the workflow, operations and functionalities of the CTA Observatory, from proposal to observations until the dissemination of results;
 - discussion with the Top-Level Architecture workgroup for the flow-down of the use cases to Observatory system architecture;
 - review the CTA Level A and B requirements to check missing or incomplete elements - participation in the requirement review meetings;
 - definition of the CTA observing modes starting from scientific cases.

- 2016-2020** **Initiator and chair of the OpenPOWER for Physical Science Work Group** (that includes the most important Information and Communication Technology industries, Data Centers, research centers and universities of the physical science field, 26 members, between them IBM, NVIDIA, Hartree Centre Science, Julich Supercomputing Centre, CINECA, INAF, UCLM):
- Technical responsibilities:
 - definition of data acquisition and processing workflow, computing infrastructures and Data Center for big physical science experiments;
 - definition of the methodology for requirement gathering;
 - definition of a common workflow and requirements between different physical science projects for the definition of computing infrastructures.
- 2015-2022** **INAF technical coordinator in the OpenPOWER Foundation.**
- 2010-2013** **System Manager of a 2-years TECNO-INAF CIWS technological project** for the definition of a Ground Support Equipment for space missions software framework for data acquisition and Payload verification.
- 2007-now** **Software Manager of the AGILE Team**, with the responsibility of coordinating the software engineering processes and computing infrastructure for the development, release, deployment and maintenance of the *AGILE Software System* developed by the AGILE Team. Some software subsystem runs at the AGILE Ground Segment at the Mission Operation Center (MOC) and Science Operation Center (SOC). The main software subsystems under my responsibility are:
- **2007. Telemetry Pre-Processing System (TMPPS)** software converts the AGILE telemetry DL0 to FITS file format DL1 (running at MOC, released to ASI/SSDC).
 - **2007. Reconstruction software (RECO)** for standard analysis of the events and background filter (running at SOC, released to ASI/SSDC).
 - **2007. AGILE Payload Health Monitoring** software system, used at MOC and released to Telespazio to check the Payload status.
 - **2007-2023. Science Tools:** the AGILE scientific analysis software for guest observers (released to ASI/SSDC).
 - **2007-2015. AGILE Real-Time Analysis first version (V1) for multi-wavelength astrophysics** includes TMPPS, RECO and automated scientific analysis pipelines on AGILE data for science alert generation and payload health monitoring (ran at INAF/OAS Bologna).
 - **2016-2023. AGILE Real-Time Analysis second version (V2) for multi-messenger astrophysics**, for the follow-up of the external science alerts received from LIGO/Virgo and from GCN network, that includes TMPPS, RECO, a Control Room and automated scientific analysis pipelines on AGILE data for automated science alert generation, data quality, and payload health monitoring (running at SOC and INAF/OAS Bologna, released to ASI/SSDC).
 - **2019-2023. AGILEScience App** connected with the AGILE Real-Time Analysis allows scientific analysis on mobile platforms.
 - **2021-2023. Agilepy**, a Python framework for scientific analysis of AGILE data with Python.
- Responsibilities:**
- **Management responsibilities:**
 - project planning and control;
 - coordination of geographically distributed software development teams (about 20 members);
 - responsible for the software delivery to ASI/SSDC.
 - **Technical responsibilities:**
 - definition of the computing and overall software requirement and architecture;
 - definition of the interfaces;
 - definition of the software management and quality assurance processes compliant with ESA/ECSS E40 standard;
 - release, deployment and maintenance of the AGILE Software System.
 - **Administrative responsibilities:** responsible for the WP software of the AGILE ASI/INAF contracts.

Responsabilità di Work package, tasks, unità operativa in progetti di ricerca

- 2023 Deputy for INAF for the participation in the Spoke 10 "Quantum Computing" project of the PNRR National Center ICSC.
- 2023 **Responsible of the WP 1250-1130 (SW Control (Mount) Management) of the CTA+ PNRR project.**
- 2022-now **Responsible of the software work-package TRANSIENT_SIM for the NASA/COSI space mission** for the simulation of transient events seen by COSI
- 2020-now INAF/OAS Bologna representative in the CTA Consortium.
- 2019-now **Work-package coordinator of the CTAO/ACADA/Science Alert Generation (SAG)** software system, for the analysis in real-time of the Cherenkov data of the CTA Observatory and the generation of science alerts to the astrophysical community. Roles:
- Define the observing strategies for the SAG to detect transients
 - Management responsibilities:
 - project planning and control;
 - responsible of the SAG In-Kind contribution to the CTA Observatory;
 - coordination of geographically distributed developing teams from INAF in the official CTA code repository and the CNRS/LAPP SAG team (about 10 members).
 - Technical responsibilities:
 - document the SAG product level C requirements specifications and verification, detailed design;
 - oversee other SAG product documentation production, including documents for requirements verification, data quality and the scientific analysis strategy;
 - participate in the ACADA overall architectural design and management decisions.
- In this context, we are also developing the **CTA/LST1 Real-Time Analysis** (the responsibility of LAPP). We are responsible for the high-level analysis (light curve and sky maps generation).
- 2022 **WP responsible of the on-board control software work-package of the ASTROGAM ESA M7 proposal.**
- 2015-2022 **Co-responsible** (with CNRS, France) **of the payload Monte Carlo simulations** of the **ASTROGAM gamma-ray observatory** proposals for ESA M4, M5, F and M7 Mission Programmes for the definition of the Instrument Response Functions and the sensitivity in the pair production regime.
- 2016-2019 **Responsibilities in the ESA/ATHENA AREMBES project** (Statement of Work ESA-SRE-F-ESTEC-SOW-2015-002) of the following tasks:
- WP leader: WP7 "Validation of the Simulator";
 - Task leader: Task 5.1 "System Requirement Definition and ATHENA event filter and data format";
 - Task leader: Task 3.3 "Low-angle protons interactions extensive testing by GEANT4.

- 2012-2016 **Responsible of the CTA On-Site Analysis** in the DATA work-package for the CTA Consortium for the analysis in real-time of the Cherenkov data of the Cherenkov Telescope Array and the generation of science alerts. Management and technical responsibilities:
- definition of the user and software requirements: requirement analysis, development of the use case document and the software requirement document compliant with ECSS E40 standard.
 - definition of the software architecture: designing of software architecture with UML and case tools applying design patterns;
 - definition of the on-site computing infrastructure and cost book;
 - definition of the software management processes;
 - coordination of geographically distributed developer teams;
 - participation in the preliminary Technical Design Review of DATA work-package;
 - development of a CTA Real-Time Analysis prototype.
- 2014-2016 Responsible of the work-package 4.1 (CTA Real-Time Analysis) of the **Premiale MIUR Progetto Premiale 2013 - Progetto TECHE.IT - Telescopi CHERENKOV made in Italy, astronomia di altissima energia utilizzando nuove tecnologie made in Italy per il progetto CTA.**
- 2013-2016 **Responsible of the Interface Control Document between CTA Data Analysis (DATA) and Array Control (ACTL)** work packages in strict collaboration with the CTA PO. The interfaces were related to the data exchange between the on-site computing infrastructure of CTA arrays and the off-site Data Center.
- 2010-2011 **Responsible** of the payload **Monte Carlo simulations** (WP 2200) of the **NHXM X-ray Observatory** proposal for the design of the NHXM payload and background shielding and member of the Ground Segment group.
- 2006-2007 **Responsible** of the **AIV plan** of the phase A/B1 of the UV instrument of the **WSO Observatory**, under ASI (Italian Space Agency), contract DC/OSU/2006/158 for the definition of the assembly, integration and verification (AIV) activities.
- 2003-2007 **Responsible of the development of the Science Console software** used during the AIV/AIT activities of the AGILE Payload in connection with the EGSE at Laben, Carlo Gavazzi Space and IABG (Munich), during the calibration campaign at BTF (INFN, Frascati) and at ISRO during the launch campaign. This software provides the following functionalities: (i) decoding of the telemetry and conversion into FITS files, (ii) graphical display and engineering analysis of AGILE Payload status (AGILE 3D quick-look). Definition of the software requirement and design documents. Software development.

Responsabilità di procedimenti e/o attività specifiche di carattere amministrativo-gestionale.

- 1) Managing contracts and agreements:

- 2022-now** **Director of the Execution of the Contract (DEC)** (Determina OABrera 40/2021) of the public tender "software based on ACS of the central control system, startup system, and integration services to the deployment of the on-site software system" of the ASTRI mini array - CIG:9157571AA5. Activities:
- Preparation of the "Capitolato tecnico" and of the applicable documents.
 - Technical responsibility of the industrial contract between INAF and AC3E/Universidad Técnica Federico Santa Maria.
- Link: [Public tender](#) (Procedura negoziata senza previa pubblicazione), Riferimento procedura : G00452, Data pubblicazione : 20/04/2022, Importo a base di gara : € 690.500,00, Data scadenza : 17/05/2022
- Esito gara: Conclusa - Aggiudicata all'Universidad Técnica Federico Santa Maria per l'importo di €. 690.000,00 (seicentonovantamila/00), Determina di aggiudicazione 0001145/2022 INAF-OA Brera.
- 2021** **Director of the Execution of the Contract (DEC)** (Determina OABrera 40/2021) of the public tender "fornitura dello Start-up system del software di controllo on-site dell'ASTRI Mini-Array e componenti del sistema SCADA - CIG : 87709229CC - CUP : C72F16000020005". Activity: preparation of the "Capitolato tecnico" and of the applicable documents.
- Link: [Public tender](#) (procedura di gara aperta), Importo a base di gara : 1.000.000,00 €, Riferimento procedura : G00337, Data pubblicazione : 19/07/2021, Data scadenza : 25/08/2021
- Esito gara: Conclusa - Senza esito a seguito di offerte irregolari/inammissibili
- 2020-2023** **Responsible for a business agreement with CIFS for the GAMMA-FLASH project for the contract ACCORDO ATTUATIVO n. 2020-5-HH.0** Codice Unico di Progetto (CUP) F84I19001980005 PER "Gamma-Flash Project: High-energy radiation and particles in thunderstorms, lighting, and terrestrial gamma-ray flashes", WP2500 Engineering Support
- Attività di referee e Guest Editor.**
- Referee of
1. 2024: "Atmosphere"
 2. 2023: "The Astronomical Journal"
 3. "Journal of Intelligence and Robotic Systems"
 4. "Journal of Astronomical Telescopes, Instruments, and System"
 5. "The Astrophysical Journal"
 6. "Astronomy and Computing"
 7. "Journal of Guidance and Control"
- Partecipazione a boards, gruppi di lavoro, commissioni, comitati e tavoli tecnici INAF e/o di strutture, enti o organismi nazionali ed internazionali.**
- since 2023** **Member of the Giunta Tecnico-Scientifico-Operativa USC VIII of the Scientific Direction of INAF.** Prot. 1069/2023 Direzione Scientifica INAF
- 2022** **Member of the evaluation commission of the Mini-Grant proposals** for RSN5. Decreto Presidente n. 23/2022
- 2019-now** **Member of the ACADA Technical Coordination Committee** as the SAG work-package coordinator
- 2021** **Member of the review panel of the CTA/NetcarCAM** focal plane camera in the CDMR review.
- 2020-now** **Member of the CTA/INAF board for the CTAO/ACADA work package.** Lettera prot. 4043/2020 Direzione Scientifica INAF.

2020-now	Initiator and actuation of the IBM-INAF agreement. Participation in the technical table.
2019-2023	<p>Elected member of INAF CSN5 as RSN5 local representative for INAF/OAS Bologna (until Feb 15, 2023). Determina INAF/OAS Bologna 244/2019.</p> <p>As a member of the CSN5, I collaborated in all activities related to the RSN5. In particular, highlights include:</p> <ul style="list-style-type: none"> • drafting the technical/scientific section of the “Piano Triennale INAF” for the years 2020, 2021, and 2022; • analysing the “schede INAF” for technology projects and activities for 2021 and 2022; • preparing all the “audizioni” (national INAF event) for RSN5 projects for 2021 and 2022; • participating in the process of selecting commissioners for the evaluation of INAF technology projects (PRIN 2020 and Grants 2022); • coordinating and organising the RSN5 Technology Forum in Bologna in June 2022, where INAF’s most significant technological research was presented and with the possibility of making available the expertise and technological facilities acquired to meet the needs of the organisation. https://indico.ict.inaf.it/event/1809/ • Participation in the workgroup: Study on the professional figures of RSN5 Researcher and Technologist at INAF. • Evaluation of technological activities: ANVUR and public competitions (concorsi). • 35 official meetings, 3 of which in person, and over 40 informal meetings. Minutes are here: http://www.inaf.it/it/sedi/sede-centrale-nuova/consiglio-scientifico/rsn-5/verbali-riunioni-crsn5; • Many working groups for specific activities (over 15)
2019-2022	Elected member of the “Consiglio Di Struttura” of INAF/OAS Bologna. Determina INAF/OAS Bologna 254/2019.
2019-now	Member of the “servizio di staff Alta Formazione”, “Visiting Program” and “Servizi Informatici e per il Digitale (SID)” of INAF/OAS Bologna. Determina INAF/OAS Bologna 49/2022.
2019-2023	Reference person for the management procedure for the “Convenzione Tirocini” with the University of Bologna, Department of Engineering.
2016-2020	<p>Member of the OpenPOWER Foundation Technical Steering Committee:</p> <ul style="list-style-type: none"> • consultant for chartering new workgroups; • resolving technical conflicts within and between workgroups; • monitoring the technical progress of workgroups; • evaluating requests for inter-project collaboration.
2018-2019	Elected member of the “ Consiglio Di Struttura ” of INAF/OAS Bologna.
2015-2016	Member of the CTA Data Analysis workgroup (DATA) Executive Board .
	<u>Dottorato, master, iscrizione ad albi professionali, specializzazioni e certificazioni professionali.</u>

2002-2006

PhD in Space Science and Technologies

CISAS "G. Colombo" (Centre of Studies and Activities for Space), University of Padua, 18/09/2006
 Dissertation: "Soft computing kinematic control algorithms for free-floating robots".

Supervisor: Prof. F. Angrilli, Director of CISAS.

Activities:

- Thesis on space robotics using genetics and fuzzy algorithms for dynamic control in a hard real-time environment of a free-floating robot in space.
- Construction, with other students, of a space robot that has flown in the ESA (European Space Agency) Student Parabolic Flight Campaign 2003.
- Participation in the landing phase on Titan of the Cassini/Huygens mission (2005) c/o European Space Operation Centre in Darmstadt (Germany): development of graphical quick-look of data.
- During the first two years attended the following courses at the University of Bologna: Astronomy I, Physics of planets, Physics of space, Nuclear and sub-nuclear physics (Dept. of Astronomy), Laboratory of Electronics (Dept. of Physics), Robotics (DISI).

1999

Chartered engineer status (Abilitazione alla Professione di Ingegnere)

Grade: **60/60**

EDUCATION AND TRAINING

2024

Course in Fundamentals of Data Management Plan and Data Models in Astrophysics

Course organised by INAF

2021

Course in Quantum Computing on IBM machines

Course organised by IBM Italia

Certificate: [FORMAZIONE.pdf](#)

2017

First Italian Astrostatistics School

Course organised by INAF/OA-Brera

2016

Certificate of training on ECSS-Q and M series standard for system engineering

Course organised by INTEC s.p.a.

Certificate: [FORMAZIONE.pdf](#)

2015

Certificate of training on ECSS-E-ST-40C standard for software engineering

Course organised by INTEC s.p.a.

Certificate: [FORMAZIONE.pdf](#)

2014

Course on System Engineering: Methodologies and Tools for the Design of Large Systems for Astrophysics

Course organised by INAF, INCOSE, ASTER

Course on Foundation of System Engineering

Course organised by INAF/IASF Bologna

Certificate: [FORMAZIONE.pdf](#)

2009

Course on MySQL Database Administrator

2003

Course on IDL intermediate

2002

International Advanced School Leonardo Da Vinci on Space Science

CNR summer school.

Summer School certificate on Space Science: "Mission Concept and Payload Design in X- and Gamma-ray astronomy"

Advanced Course in Space Systems

CISAS "G. Colombo" (Center of Studies and Activities for Space), University of Padua.

Dissertation: "Data acquisition and command of the AGILE Minicalorimeter Digital Front End"

Supervisor: Prof. Stefano Debei

Certificate: [FORMAZIONE.pdf](#)

- 1993-1999 [Degree in Computer Engineering \(Diploma di Laurea in Ingegneria Informatica\)](#)
University of Modena and Reggio Emilia, 21/10/1999
Dissertation: "A Decision Support System on the management of Construction and Demolition wastes".
Supervisor: Prof. Flavio Bonfatti.
Co-advisor: Arch. Ernesto Antonini, Prof. Luigi di Stefano.
Grade: **110/110 cum laude**
Certificate: [FORMAZIONE.pdf](#)
- 1985-1990 [Secondary School Diploma in Agriculture \(Diploma di Perito Agrario\)](#)
Istituto Tecnico Agrario Statale "Beggio", Palidano (MN)
Grade: **60/60**

PERSONAL SKILLS

Mother tongue(s) Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1
PET B2 (2010)					

Digital skills

SELF-ASSESSMENT				
Information processing	Communication	Content creation	Safety	Problem solving
Proficient	Proficient	Proficient	Proficient	Proficient
Levels: Basic user - Independent user - Proficient user Digital competences - Self-assessment grid				

Driving licence ▪ B

ADDITIONAL INFORMATION

**PUBLICATIONS AND
PRODUCTS**

ADS reports 852 documents, between them

- 138 referred papers
- 231 ATEL
- 291 GCN
- 192 proceedings

Between them I have

- 8 refereed papers as first author
- 7 refereed papers as scientific supervisor of the first author
- 18 proceedings as first author, between them 1 peer-reviewed proceeding cited 207 times
- 20 proceedings as scientific supervisor of the first author
- 1 Vizier database as first author and 5 as co-author
- 37 Astronomical Telegram
- 1 GCN Circular as the first author
- 8 internal reports as first author and 20 as co-author
- 39 official technical notes (include a SoW) and 56 as co-author
- participation in 6 proposals for ESA Mission Opportunity Call
- 9 technical notes as technical analysis for instrument development as first author and 10 as co-author
- 3 chapters in a book
- 1 paper in an outreach Italian magazine

h-index = 46 (Scopus)

h-index = 45 (ADS)

The full list of publications and products is reported in Annex F, that is an integral part of this CV

Le informazioni contenute nel presente "curriculum vitae et studiorum" sono rese sotto la personale responsabilità del sottoscritto, ai sensi degli articoli 46 e 47 del Decreto del Presidente della Repubblica 28 dicembre 2000, numero 445, e successive modifiche ed integrazioni, consapevole della responsabilità penale prevista dall'articolo 76 del medesimo Decreto per le ipotesi di falsità in atti e dichiarazioni mendaci.

Autorizzo il trattamento dei miei dati personali ai sensi del Decreto Legislativo 30 giugno 2003, n. 196 e del GDPR (Regolamento UE 2016/679).

Casalecchio Di Reno, Jul 8, 2024

In fede
Andrea Bulgarelli