europass Curriculum vitae

PERSONAL INFORMATION

Simone Dall'Osso

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Date of birth 15 September 1973 | Nationality Italian

JOB APPLIED FOR

Attività di ricerca di segnali gravitazionali quasi continui da magnetar

RESEARCH INTERESTS

Magnetars - *Birth & evolution*: models of Gravitational Wave (GW) long-transient signals, shock break-out in core-collapse supernovae & neutron star (NS) mergers, Gamma Ray Bursts (GRBs), Fast Radio Bursts (FRBs); *Physics*: Magnetic field decay, equation of state (EoS).

GW Astronomy - *Signal Detection*: continuous wave (CW) searches from NS; pipeline development for GW long-transients; *Multi-messenger astronomy*: GW & electromagnetic (EM) search strategies for newborn NS; science case development for future EM and GW detectors.

GRBs -*Light-curve models*: (i) high-latitude emission from relativistic structured jets (prompt); (ii) relativistic shock-waves with energy injection (afterglows).

FRBs - (i) gravitational lensing in the strong field regime; (ii) modelling the energy and temporal distributions of cosmic FRBs; (iii) constraints on the source physics and its GW emission.

Compact Binaries - Tidal and magnetic interactions in binary NS/white dwarf systems and their coupling to GW emission.

Magnetically-coupled accretion discs - models of super-Eddington accretion onto highly magnetised NS, for studying the central engines in Ultra-Luminous X-ray sources and GRBs.

WORK EXPERIENCE

Dec. 2021–Present

Researcher (TD)

Marie Curie Co-Funded Fellini Fellow at INFN-sede di Roma, Italy *Multi-messenger astrophysics of newborn magnetars.*

Nov 2019 – Nov 2021

Post-doctoral Researcher (AdR)

Gran Sasso Science Institute (GSSI), L'Aquila, Italy

Multi-messenger studies of neutron star mergers, GRBs and magnetars

July 2018-Dec 2018:

Visiting Researcher

Gran Sasso Science Institute (GSSI), L'Aquila, Italy

Multi-messenger study of neutron star mergers, GRBs and magnetars.

May 2016 – May 2018

Post-doctoral Research Associate

NSF-Funded Project at the Dept. of Physics & Astronomy, Stony Brook University, NY, US *Theoretical study of the X/γ-ray and GW emission from long and short GRBs.*

Returned to Italy ahead of time due to pressing family reasons.

Nov 2015-Apr 2016:

Physics Teacher, Liceo Scientifico "Cavour", Roma, Italy

Short-term interruption of research activity (abroad) due to birth of first child (in Italy)

June 2013 – May 2015

Post-doctoral Researcher (TD)

Theoretical Astrophysics Group at the University of Tübingen, Germany

Funded by the SFB/TR7 program, an inter-university german network for GW astronomy

Theoretical study of the physical properties of magnetars and other compact objects, with implications for GW observations.

June 2010 – June 2013

Visiting Researcher (TD)

Racah Institute for Physics, The Hebrew University of Jerusalem, Israel

ERC-funded position dedicated to *Theoretical studies of GRB central engines and predictions of possible GW signals.*

June 2008 – May 2010

Postdoc (AdR)

INAF-Osservatorio Astronomico di Roma, Monte Porzio Catone (Roma), Italy

VESF-Funded Project on: *Newly Born Magnetars as sources of Gravitational Waves*

January 2007 – May 2008

Postdoc (Borsa di Studio)

Università degli Studi di Pisa, Dip. di Fisica 'E. Fermi', Pisa, Italy

VESF-Funded Project (Virgo-Ego Scientific Forum) on: *Stellar Evolution of progenitor systems and analysis of local galactic sources for stochastic background*

January 2005 – December 2006

Postdoc (AdR)

INAF-Osservatorio Astronomico di Roma, Monte Porzio Catone (Roma), Italy

Astrophysics of Compact Objects with Extreme Properties

EDUCATION

2001–2004

PhD - Thesis Title: 'Probing the nature of Anomalous X-ray Pulsars through high-precision timing analysis'

"Sapienza" Università di Roma, Roma, Italy

Obtained: 24/03/2004 – **Supervisor:** prof. Luigi Stella

1992-1999

Degree in Astronomy ("Laurea") - Thesis Title: 'Supernova rate in starburst galaxies and production of the extragalactic γ-ray background at E >100 MeV'

Università degli Studi di Bologna "Alma Mater Studiorum", Italy

Obtained: 20/12/1999 – **Marks**: 110/110 cum laude – **Supervisor**: prof. Giancarlo Setti

TRAINING

2002 September

National School of Astrophysics: Cosmology & Relativistic Astrophysics

Asiago Observatory, Italy

2002 June

High Energy Astrophysics for and from Space, International School "Daniel Chalonge"

Observatoire de Paris, Paris, France

2001 September

National School of Astrophysics: Spectroscopy & Chemical Evolution of Galaxies

SISSA - Trieste, Italy

2001 May — National School of Astrophysics: Solar System & Stellar Evolution
Sirolo, Italy

1999 June — National School of Astrophysics: Stellar Evolution & IR Astronomy
Carloforte, Italy

PERSONAL SKILLS

Mother tongue: Italian

Other languages

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Hebrew	A1	A2	A2	A1	A1

Levels: A1 and A2: Basic user – B1 and B2: Independent user – C1 and C2: Proficient user
Common European Framework of Reference for Languages

LARGE INTERNATIONAL COLLABORATIONS

LIGO/Virgo/Kagra Collaboration
Member of the Continuous Wave Working Group; Member of the Rome Virgo Group

ET Collaboration
Member of the Continuous Wave Working Group; Member of the Rome Group

eXTP Consortium
Coordinator of the Working group on Multi-messenger Science *eXTP is a Chinese large area high time resolution and polarimetric X-ray mission, for the study of the physics of ultra-dense matter and the strong-field regime of gravity, to be proposed to the Chinese Space Agency.*

THESEUS Consortium Member
Member of the THESEUS *Multi-messenger* Science Group
THESEUS is a large area X/gamma-ray mission for the study of high-energy transients that is competing as a concept within the ESA Cosmic Vision program - M4 missions.

Lunar Gravitational Wave Antenna (LGWA)
Member of the LGWA Science Group
The LGWA is a concept mission that plans to deploy a Gravitational Wave Antenna on the Moon surface, to monitor its quadrupolar oscillations induced by the passage of GWs.

ULTRASAT
Collaborator of the ULTRASAT Science Case Study Group
ULTRASAT is a wide field-of-view Israel-US UV satellite, to be launchd in 2026, dedicated to the study of various astrophysical transients, with a special focus on shock break-outs in CCSNe.

COMPUTING EXPERIENCE

Skills

Software
I am familiar with various types of Software and packages:

- Languages:Python, Fortran, LaTeX
- Operating Systems: UNIX , MacOS X
- Applications: MatLab, Mathematica, OpenOffice

POSITIONS OF RESPONSIBILITY

Leadership

Coordinator: *Working group on Multi-messenger Science for the eXTP White Paper.*
2023 – (Contact prof. Andrea Santangelo, andrea.santangelo@uni-tuebingen.de)

Leadership

Member of the writing team: *ET science case on Continuous Waves (CW) and NS physics for the ET White Paper*

2023 – (Contact Dr. Cristiano Palomba, cristiano.palomba@roma1.infn.it)

Leadership

Member of writing team: *LIGO/Virgo post-O5 observing scenario.*

In particular, I am co-responsible for the section on CW/long-transients

2021- Present. (Contact Dr. Cristiano Palomba, cristiano.palomba@roma1.infn.it)

Leadership:

Spokesperson: *Theoretical Astrophysics at Tübingen University*

for activities within the german interuniversity network SFB/TransRegio 7 on GW sources 2013-2015

Membership

LIGO/Virgo collaboration

I run pipelines for GW searches from GRBs, and follow activities of the continuous waves group, within which I am responsible for the development of a new pipeline for GW long-transients. 2020-Now

Membership

THESEUS Mission Consortium

A mission concept for the study of high-energy transients. I participated to the writing of the multi-messenger science case in the THESEUS yellow paper, with a focus on the search for EM counterparts to the GW signals expected from magnetars and/or core-collapse SNe. 2020-Now

Peer-review

Referee *for peer-review journals*

Nature; The Astrophysical Journal; The Astrophysical Journal Letters; Monthly Notices of the Royal Astronomical Society,;Astronomy & Astrophysics; Physics Review D; Publications of the Astronomical Society of Japan

Committee membership

Member: *Time Allocation Committee, NASA-SWIFT Satellite*

Cycles: 14 & 17 – yrs: 2017 & 2020 (Contact Dr. Eleonora Troja, eleonora.troja@uniroma2.it)

FELLOWSHIPS, GRANTS, AWARDS

Fellowship

FELLINI at Istituto Nazionale di Fisica Nucleare (INFN)

2021-2023

Multi-messenger astrophysics of newborn magnetars

Role: PI

Peer-reviewed, EU-funded project for the study of newborn magnetars as multi-messenger sources of astrophysical transients.

Grant

NASA-Swift (Theory)

2016

Swift precursors to long GRBs: hidden signs of a newly-born, hyper accreting magnetar?

Role: Co-PI

Peer-reviewd, NASA/Swift-funded project aimed at developing a new model for long gamma-ray burst central engines, based on the interaction between the strong magnetic field of a newborn, millisecond spinning magnetar, and a hyper-critical accretion flow. PI: prof. Rosalba Perna

Grant

National Science Foundation (NSF) - AST

2017-2018

Gamma-Ray Bursts and Magnetars: Astrophysical Connections and Probes of Fundamental Physics

role: Co-PI

Peer-reviewd, NSF-funded project for the theoretical study of the central engines in long- and short-GRBs, with applications to multi-messenger observations. PI: prof. Rosalba Perna

Grant

Virgo-Ego Scientific Forum (VESF)

2009-2010

Newly born magnetars as sources of gravitational waves

Role: Co-PI Development of a new model for GW emission from newborn magnetars. We studied the role of the NS interior viscosity, and calculated the signal amplitude/phase evolution as a function of the NS magnetically-induced mass quadrupole, EoS and spin period. PI: prof. Luigi Stella

Award *'Abilitazione scientifica nazionale'*
Oct 16, 2023 02/C1 – Associate Professor – Astronomy & Astrophysics
Nov 7, 2023 02/A1 – Associate Professor – Experimental Physics of Fundamental Interactions

MAIN COLLABORATIONS

- University of Stony Brook, NY, US. Prof. Rosalba Perna
- INAF-OAR, Monteporzio Catone. Prof. Luigi Stella and Dr. Gianluca Israel
- INAF-OAS Bologna. Dr. Giulia Stratta
- Goethe University, Frankfurt, Germany, Dr. Giulia Stratta and Prof. Luciano Rezzolla
- Ariel University, Israel, Prof. Dafne Guetta
- Istituto Universitario di Studi Superiori (IUSS) Pavia, Italy, Prof. Paolo Esposito
- INAF - Osservatorio Astronomico di Merate, Italy, Dr. Sara Motta
- INAF - Osservatorio Astronomico di Cagliari, Italy, Dr. Andrea Possenti
- University of Tübingen, Prof. Andrea Santangelo
- Leiden Observatory, Netherlands, Prof. Elena Rossi

SUPERVISING EXPERIENCE

Supervision of Ph.D. thesis

2022-currently "Sapienza" Università di Roma & Ariel University (Co-tutoring). Student: Sandhya S. Menon. *Cutting-edge strategies to identify new gravitational and electromagnetic wave long transients using current and next-generation detectors* Supervisors: prof. Pia Astone & Dafne Guetta

2022 Università di Roma "Tor Vergata" & INAF-OAR (Co-tutoring). Student: Riccardo LaPlaca *Strong field gravity as a magnifying glass on the physics of compact objects* Supervisor: prof. L. Stella

Supervision of Master thesis (or equivalent)

2023 University of Bologna "Alma Mater Studiorum". Student: Luca Guglielmi (Co-supervision). Thesis topic: "Incidence of afterglow plateaus in short gamma-ray burst light-curves". Supervisor: prof. M. Brusa

2015 "Sapienza" Università di Roma. Student: Stefano Ascenzi (Co-supervision). Thesis topic: "The disk-magnetosphere interaction and the limiting spin period of accreting neutron stars". Supervisor: prof. L. Stella

2012 University of Rome "Tor Vergata". Student: Paritosh Verma (Co-supervision). Thesis topic: "Study of the detectability of gravitational wave signals from highly magnetic ms accreting neutron stars". Supervisor: prof. Viviana Fafone

TEACHING EXPERIENCE

I have co-tutored and am currently co-tutoring undergraduate and graduate students in the research and writing of their degree Theses on various topics of the astrophysics and GW science of neutron stars. I have taught two short courses for graduate students on High-Energy Astrophysics and GW sources, at the University of Trento and at the GSSI in L'Aquila. I gave lectures on specific topics within wider courses on Astrophysics at the University of Tübingen and at Stony Brook University, and I have co-tutored various groups of Physics students at "Sapienza" University of Rome in their projects on "Data analysis with GW LIGO/Virgo.

2021 Dec- 2022 Dec: Tutor in the project "Data analysis with the Gravitational Wave LIGO/Virgo data" for last years Physics students at "Sapienza" University of Rome.

April 2019 Short course for students of the PhD program in Astroparticle and Cosmology at the Gran Sasso Science Institute, L'Aquila, Italy. Course title: Astrophysical Transients. Topics: Gravitational wave emission from compact binary coalescence and newly born neutron stars, physics of gamma-ray burst central engines and relativistic shocks, kilonova models and observations

2014 Lectures on Newly born magnetars in core-collapse supernovae and binary NS mergers as ideal sources of gravitational waves.

2009 Lectures for students of the PhD program in physics at the University of Trento. Reference: prof. Giovanni Prodi

OUTREACH

Feb 2024: Associazione no-profit AstronomiAmo - Invited Public online Conference on: "Magnetars: mysterious NS as sources of the most mysterious cosmic explosions".

July 2023: Interview for the journal BBC Science Italy on "A possible link between Magnetars and Gamma-Ray Bursts"

2021 - Now: Member of the nation-wide program Lab2Go for promoting and enhancing the use of Lab practises in the teaching of Physics in high schools

2021: Interview in the Podcast Co.Scienza about the science and technology of the proposed mission LGWA (Lunar Gravitational Wave Antenna)

2016: Invited Public Conference on: "Gravitational Waves: a new way to 'listen' to the Universe" at the Liceo Scientifico (Scientific High School) "Cavour", Rome, Italy.

2016: Public Conference on "Black Holes: from early speculations to modern astrophysics" as part of the program "Astronomy Open Nights" of the Department of Physics & Astronomy, Stony Brook University (US)

LECTURES, TALKS AND SEMINARS

Invited Lectures and seminars

March 2024: University of Bologna - Department of Physics
The birth and life of magnetars: a multi-messenger tale

October 2023: Goethe University of Frankfurt - Department of Physics
The Magnetar Legacy

Feb 2023: University of Cagliari - Department of Physics
The Magnetar Legacy

Dec 2022: "Sapienza" University of Rome - Department of Physics
The Magnetar Legacy

Nov 2022: Center for Computational Astrophysics - Flatiron Institute - NYC
Magnetar central engines in Gamma-ray Bursts and Fast Radio Bursts

July 2021: NAOJ - National Astronomical Observatory of Japan
The multi-messenger magnetar legacy

Dec 2018: Gran Sasso Science institute (GSSI)
Multi-messenger studies of NS physics: status and prospects for current+future detectors

May 2018: University of Trento - Trento Institute for Fundamental Physics Applications
Newborn magnetars as the brightest multi-messenger neutron star sources

April 2017: Astronomical Observatory of Rome (Italy)
Witnessing the birth of ultra-magnetized neutron stars with joint gravitational wave and electromagnetic observations

April 2017: New York City College of Technology
Gravitational Wave observations and the physics of neutron stars

October 2015: Seminar at the Dept. of Physics & Astronomy, Stony Brook Univ. (NY)
NuStar J095551: an Hyper-accreting, highly magnetized neutron star

October 2014: Seminar at the Dept. of Physics & Astronomy, Stony Brook Univ. (NY)
NS physics with GW astronomy: importance of being magnetic

October 2014: Seminar at the Center for Cosmology and Particle Physics, NY University
Gravitational Waves from massive magnetars formed in binary neutron star mergers

July 2014: Astro-GR/VESF-School "Gravitational Waves and electromagnetic observations of dense stellar systems" – Roma
Studying NS formation and EoS with GWs from newly born magnetars

February 2013: Seminar at INAF - Osservatorio Astronomico di Merate (Italy)
Decaying magnetic fields of magnetars: evidence and inference

October 2012: Seminar at Institute of Astrophysics & Space Science (IAPS), Rome (IT)
Magnetic field decay in NSs: three different populations of highly magnetized NSs?

March 2012: Seminar at Raymond & Beverly Sackler School of Physics and Astronomy, Tel Aviv University, Tel Aviv (IL)
The decaying magnetic field of magnetars

November 2011: Astrolunch talk, Racah Institute of Physics, The Hebrew University of Jerusalem
The decaying magnetic field of magnetars: evidence and inference

October 2011: invited seminar at the Osservatorio Astronomico di Roma (Italy)
Magnetic Field Decay in Magnetars

June 2011: lunch talk at the Leiden Observatory (NL) *Tidal interaction in coalescing compact binaries*

February 2010: HEAD lunch talk at the Harvard-Smithsonian Center for Astrophysics, Cambridge (MA)
Magnetars: from X-rays to Gravitational Waves (and back)

June 2009: invited seminar at University of Trento, Trento (Italy) *High-Energy Astrophysics and Gravitational Wave Sources*

March 2009: seminar at Anton Pannekoek Institut, Amsterdam (NL) *Astrophysics with Magnetars: present and beyond*

Oral Contributions at National and International conferences

2022, Sept. 12-15 Congresso Nazionale GRB – Trieste invited review, *GRB central engines*

Sept. 26-30, 2022 Congresso Nazionale Oggetti Compatti (CNOC) – Cefalù invited review – *GW searches of Continuous Wave and Long-Transient sources*

2020, May 31-June 4 EAS 2020 (EWASS) Virtual Meeting - S5e: lessons from the observed GW sources contributed talk – *Structured jets imply a very low rate of multi-messenger GRB detections*

2019, July 3-5 THESEUS Mission Consortium Meeting, Bologna

2017 Nov. 20-22 "Workshop – The Astrophysics of NS Mergers", CCA, Flatiron Institute, NY invited participant

2016 Nov. 17-18 "Time-Domain Astrophysics: Incorporating Observations, Theory, and Computation in the American Northeast", Radcliffe Institute, Cambridge (MA) invited - 2 talks

2016, May 23-28 "Frontier Research in Astrophysics - II" – Mondello, Italy invited - declined for personal reasons

2015, Aug 31st-Sept 2nd "GRB Workshop" – Riken, Japan invited talk – *GW signals from remnants of core-collapse and BNS mergers*

2015, March 21-28 "Rencontres de Moriond" – La Thuile, Italy invited review – *NS and magnetars as sources of GW waves signals*

2015, Feb. 2-6 "Compact Objects as Astrophysical and Gravitational Probes" – Leiden invited participant

2014, Dec. 1-5 "Gravitational Wave Astronomy, 2014 – Jena contributed talk – *GW signals from newborn magnetars in core-collapse and BNS mergers*

2014, Jan. 20-24 Gamma-ray Burst/Magnetar thinkshop (GRBMAG14) – Bormio invited participant

2013, Sept. 23-26 ESF Workshop "High Energy Tidal Disruption Events: looking at the future", Favignana (Italy) invited talk – *Tidal effects in ultra-compact neutron star or white dwarf binaries*

2012, Oct. 7-12 "Fall 2012 GRB Symposium", Marbella (SP) contributed talk – *Tidal torque prior to coalescence NS binaries*

2012, Aug. 20-24 "Neutron Stars and Pulsars: Challenges and Opportunities after 80 years", 28th IAU General Assembly, Beijing
contributed talk – *Magnetic field decay in NS interiors: evidence and inference from magnetars observations*

2012, June 12-15 "Magnetic Field in Neutron Stars. Origin, evolution and decay", Anton Pannekoek Institute, Amsterdam University, Amsterdam (NL)
invited talk – *Decay of exterior and interior magnetic fields in magnetars*

2010, Sept. 27-Oct. 1st "SIGRAV Conference 2010", Scuola Normale Superiore di Pisa, Pisa invited talk – *Newly born magnetars as GW sources*

2010, March 26-31	"Current problems in theoretical physics", Vietri invited talk – *Newly born magnetars as GW sources*
2009, Sept. 19-24	"National Conference on Compact Objects", Cagliari contributed talk – *Newly born magnetars as GW sources*
2009, Sept. 5-10	"The Shocking Universe", Venice contributed talk – *Plateaus in GRB X-ray afterglow lightcurves due to energy injection from millisecond spinning NS*
2008, Sept. 1-5	"AM CVn Workshop", Cape Town invited talk – *Unipolar Inductor Model for ultra-compact white dwarf binaries*
2007, Sept. 10-14	"Matter at Extreme Densities and GWs from Compact Objects", at European Centre for Theoretical studies on nuclear physics, Trento contributed talk – *Magnetar formation scenarios and GW emission*
2007, April 23-25	"Virgo Ego Scientific Forum Council Meeting", Cascina (Italy) contributed talk – *GW emission as a probe of magnetar formation scenarios*
2006, June 19-24	"The multicoloured Landscape of Compact Objects and their explosive origins", Cefalù contributed talk – *Unipolar Inductor Model for ultra-compact white dwarf binaries*
	"Isolated Neutron Stars: from surface to interior", London, 2006, Apr 24-28 contributed talk – *Magnetars: X-ay and GW Rosetta stones for the study of NS interiors*
	"National Conference on Compact Objects", Padova, 2005, Nov. 23-25 contributed talk – *Unipolar Inductor Model for ultra-compact white dwarf binaries: theory and application*
2005 July	"Workshop on AM CVn Stars", Nijmegen (Netherlands) contributed talk – *The Unipolar Inductor Model explains the peculiar properties of the shortest orbital period binaries known*
2003 Dec. 10-12	"National Conference on Compact Objects", Roma contributed talk – *Glitches in Anomalous X-ray Pulsars: a probe of enhanced magnetic stresses in NS interiors*
	"X-Ray Timing 2003: Rossi & Beyond", Boston (MA), 2003 Nov. 3-5 contributed talk – *The glitches of the Anomalous X-ray Pulsar RXJ 1708*

Le informazioni contenute nel presente *Curriculum vitae et studiorum* sono rese sotto la personale responsabilità del sottoscritto ai sensi degli artt. 46 e 47 del Decreto del Presidente della Repubblica 28 Dicembre 2000 n. 445, e successive modifiche ed integrazioni, consapevole della responsabilità pensale prevista dall'art. 76 del medesimo Decreto, per le ipotesi di falsità in atti e dichiarazioni mendaci.

Roma, 16 Dicembre 2023

Simone Dall'Osso