europass Curriculum vitae

PERSONAL INFORMATION

Simone Dall'Osso

INFN–Roma 1, piazzale Aldo Moro 2, 00185, Roma, Italy

[redacted]zioneposta.it

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 & CCA at Flatiron Institute, 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. Reference: prof. Pia Astone

March-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

July 2014 Lecture (2 hr) on Newly born magnetars in core-collapse SNe and binary NS mergers as ideal sources of gravitational waves, VESF-School at INAF - Osservatorio Astronomico di Roma

June 2009 Short Course (6 hr) on "X-ray Astrophysics and GW sources" 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

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

2024, February 14-16: Looking AHEAD to soft gamma-ray Astrophysics: prospects and challenges – Ferrara
contributed talk – *New views on magnetar central engines in gamma-ray bursts*

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

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

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, January 25, 2024

Simone Dall'Osso