

# Curriculum Vitae

## Personal information

Name: Inguglia, Gianluca  
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Current position: Junior Group Leader (tenure track)  
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Project URL: InterLeptons



## Education

2014 Ph.D. in Physics, Queen Mary University of London.  
2011 M.Sc. in Physics, University of Groningen.  
2008 B.Sc. in Astronomy, University of Bologna.

## Scientific positions

Since 2021 University lecturer at the University of Vienna.  
Since 2020 HEPHY Junior Group Leader with tenure track, Austrian Academy of Sciences.  
Since 2020 Project leader for the ERC StG 947006, *InterLeptons: A search for new interactions at Belle II using leptons*, HEPHY-Vienna, Austria.  
Since 2018 Project leader for FWF P31361, *Searches for dark matter and dark forces at Belle II*, HEPHY-Vienna, Austria.  
Since 2018 University Lecturer at the TU Wien.  
2017-2020 Postdoc, HEPHY-Vienna, Austria.  
2014-2017 DESY postdoc Fellow at Belle II, DESY-Hamburg, Germany.

## Third-party fundings acquired

**Total third-party funding acquired since 2018: 1,764,471.00 EUR.**

***InterLeptons: A search for new Interactions at Belle II using leptons***, European Research Council, Starting Grant, funding ID ERC-StG nr. 947006, 1,486,137.00 EUR, 11/2020–10/2025.

***Search for dark matter and dark forces at Belle II***, FWF Austrian Science Fund, Stand-Alone, funding ID FWF P31361-N36, 278,334.00 EUR, 2018–2022.

## Fellowships and awards

- 2014-2017 DESY Fellowship in Experimental Physics.
- 2009-2011 CHIEN SHIUNG WU DIPLOMA, LINDENBAUM DIPLOMA, DALITZ DIPLOMA, prizes awarded at ISSP 2009, 2010, 2011 by Prof. A.Zichichi and by Prof. Gerardous 't Hooft.
- 2010 INFN grant to participate at *Les rencontres de physique de la Vallee d'Aoste*.

## Supervision of graduate students

- Since 2021 5 Master students, 5 PhD students, 1 postdoc, HEPHY.
- Since 2019 4 Master students, 2 PhD students, HEPHY.
- 2018-2019 2 Master students 1 PhD student, HEPHY.
- 2016-2017 2 Master students, DESY.

## Management and commission of trust

- Since 2021 Chair of the Belle II Statistics Advisory Committee.
- Since 2020 Member of the management of the Institute of High Energy Physics of the Austrian Academy of Sciences.
- Since 2020 Member of the organizing committee of early career research panel of the European Committee for future accelerators, and plenary-ECFA elected observer.
- Since 2019 Member of the Executive Board of the Belle experiment.
- Since 2019 Convenor for the Belle Collaboration of the Dark Sector Physics group.
- Since 2019 Convenor for the JENNIFER II Consortium of the Dark Sector Physics activities.
- Since 2019 Liaison for the Belle2 Machine Learning group and Belle II Stat. Adv. Committee.
- Since 2018 Member of the Belle II Statistics Advisory Committee.
- Since 2018 Project leader, project FWF Stand-Alone P31361, *Searches for dark matter and dark forces at Belle II*, HEPHY, Vienna.
- 2017-2018 Convenor of the Belle II Statistics and New Physics Group (evolved into the Belle II Statistics Advisory Committee).
- Since 2015 Referee for international *Journal of High Energy Physics*, *IoP*, *Physics Letters B*, *Chinese Physics C*.

## Ongoing and past research

- Since 2021 Belle II Collaboration: coordinator of the precision tests of lepton flavour universality in leptonic and hadronic  $\tau$  decays (5 analyses).
- Since 2020 Study and optimization of machine and deep learning algorithms for particles physics, specifically in the particle identification of leptons and in the search of new particles.
- Since 2019 Belle II Collaboration: leadership role in the search for invisible dark Higgs boson at Belle II.
- Since 2018 Leader of the performance and monitor studies of CDC trigger for low and very low multiplicity events at Belle II.
- Since 2018 Belle II Collaboration: leader of the sensitivity studies for LFU in  $\tau$  at Belle II.
- Since 2018 Belle II Collaboration: leader of the searches for invisible (and LFV)  $Z'$  decays at Belle II.
- Since 2017 Belle II Collaboration: leader of the searches for invisible and LFV  $\Upsilon(nS)$  decays at Belle II.
- Since 2014 Belle Collaboration: contribution to various activities on the searches for dark sector at the Belle experiment (review committee of various papers).
- 2014-2017 Belle II Collaboration: leader of the feasibility studies for the search of dark sector particles/forces in meson decays with invisible final states at the Belle II experiment (preliminary sensitivities presented at ICHEP 2016). Leader of BEAST2 background studies and characterization on diamond and PXD sensors.
- 2012-2015 ARACHNID Collaboration: R&D and hardware studies for the Cherwell Pixel sensor.
- 2011-2014 SuperB Collaboration: vertexing (simulation, analysis) and CP violation in charm (phenomenology, experimental resolution studies).
- 2012-2013 CERN SPS: Zone Patrol Rights (bldg 887) H6 (126, 136, 146, 156, 166), (EHN1H6).
- 2010-2011 BESIII Collaboration: radiative decays in charm.
- 2009-2010 Km3NeT Collaboration: PMT Calibration (Hardware, R&D).

## List of selected publications

- 2022 “Search for a dark photon and dark Higgs boson in  $\mu^+\mu^-$  and missing energy final states with the Belle II experiment”, the Belle II Collaboration, submitted to PRL, ArXiv:2207.00509, 2022.
- 2022 “Towards excluding a light  $Z'$  explanation of  $b \rightarrow s\ell^+\ell^-$ ,” A. Crivellin, C. A. Manzari, W. Altmannshofer, G. Inguglia, P. Feichtinger and J. M. Camalich,, submitted to PRL, arXiv:2202.12900 [hep-ph], accepted for publication on PRD 2022.
- 2022 “Testing Lepton Flavour Universality Violation in the Charged Current with Kaon, Pion, Tau and Beta Decays,” D. Bryman, V. Cirigliano, A. Crivellin and G. Inguglia, Annual Review of Nuclear and Particle Science **72**, ArXiv: 2111.05338, 2021.
- 2021 “Punzi-loss: A non-differentiable metric approximation for sensitivity optimisation in the search for new particles”, P. Feichtinger, H. Haigh, G. Inguglia, J. Kahn *et al.*, Eur. Phys. J. C **82** (2022) 121, ArXiv: 2110.00810.
- 2021 “Muon and electron identification efficiencies and hadron-lepton mis-identification rates at Belle II for Moriond 2021”, Belle II lepton ID performance group, Belle II public conference paper: BELLE2-CONF-PH-2021-002.
- 2020 “Search for an invisibly decaying  $Z'$  boson at Belle II in  $e^+e^- \rightarrow \mu^+\mu^-(e^\pm\mu^\mp) +$  missing energy final states”, Belle II Collaboration, Phys. Rev. Lett. **124**, 141801, 2020.
- 2018 Author of several bottomonium and dark sector sections and leading reviewer of the  $\tau$  *physics* chapter of “The Belle II Physics Book”, *PTEP* **12**, 123C01, DOI: 10.1093/ptep/ptz106, KEK Preprint 2018-27, BELLE2-PUB-PH-2018-001, FERMILAB-PUB-18-398-T, JLAB-THY-18-2780, INT-PUB-18-047, UWThPh 2018-26, ArXiv:1808.10567.
- 2016 “Belle II studies of missing energy decays and searches for dark photon production”, G. Inguglia, PoS **263**, arXiv: 1311.2754.
- 2013 “First tests of CHERWELL, a Monolithic Active Pixel Sensor: A CMOS Image Sensor (CIS) using 180nm technology”, James Mylroie-Smith, Scott Kolya, Jaap Velthuis, Adrian Bevan, Gianluca Inguglia *et al.*, DOI: 10.1016/j.nima.2013.05.023, Nucl. Instrum. Meth. A **731** (2013).
- 2013 “Neutral meson tests of time-reversal symmetry invariance”, A. Bevan, G. Inguglia, M. Zoccali, arXiv:1302.4191.
- 2011 “Time Dependent  $CP$  Asymmetries in  $D$  and  $B$  decays”, A. Bevan, G. Inguglia, B. Meadows, Phys. Rev. D **84**, 114009, ArXiv:1106.5075.

## Publications being prepared for submission

- Finished, submitted shortly “Search for invisible decays of a  $Z'$  boson in  $e^+e^- \rightarrow \mu^+\mu^- +$  missing energy final states at Belle II with 2019+2020 data”, M. Campaiola, P. Feichtinger, H. Haigh, G. Inguglia *et al.*, and the Belle II Collaboration, to be submitted to PRL.
- Target 09/2022 “Search for a Muonic dark force in  $e^+e^- \rightarrow \mu^+\mu^-\mu^+\mu^-$  at the Belle II experiment”, Enrico Graziani, Martina Laurenza, Gianluca Inguglia, Rajesh Maiti and the Belle II Collaboration, to be submitted to EPJ C.

## List of selected Collaboration notes and conference papers

- 2021 “Search for invisible decays of a  $Z'$  boson in  $e^+e^- \rightarrow \mu^+\mu^- +$  missing energy final states at Belle II with 2019+2020 data”, M. Campaiola, P. Feichtinger, H. Haigh, G. Inguglia *et al.*, Belle II note: BELLE2-NOTE-PH-2021-040.
- 2021 “Search for lepton flavor universality violation in leptonic  $\tau$  decays with 1x1 topologies”, A. Martini, A. Rostomyan, G. Rauber, G. Inguglia *et al.*, Belle II note: BELLE2-NOTE-PH-2021-034.
- 2021 “Search for lepton flavor universality violation in leptonic  $\tau$  decays with 3x1 topologies”, A. Martini, A. Rostomyan, G. Rauber, G. Inguglia *et al.*, Belle II note: BELLE2-NOTE-PH-2021-033.
- 2020 “Development and test of multivariate analysis tools to identify the reaction  $e^+e^- \rightarrow \tau^+\tau^-$ ”, Lukas Linauer and Gianluca Inguglia, Belle II note: BELLE2-NOTE-PH-2020-069.
- 2020 “Search for Dark Higgsstrahlung in  $e^+e^- \rightarrow \mu^+\mu^-$  and missing energy final states with the Belle II experiment”, Michel Bertemes, Marcello Campajola, Giacomo De Pietro, Enrico Graziani, Gianluca Inguglia, Belle II note: BELLE2-NOTE-PH-2020-048.
- 2020 “L1 CDC trigger performance study targeting dark sector analyses with 2019 data”, Michel Bertemes and Gianluca Inguglia, Belle II note: BELLE2-NOTE-TE-2020-014.
- 2020 “Pion identification efficiency and lepton mis-id rates using tau events with 3-prong 1-prong topology”, Paul Feichtinger, Gianluca Inguglia, Ilya Komarov, Alberto Martini, Belle II note: BELLE2-NOTE-TE-2020-001.
- 2019 “Monitor of CDC trigger performance for low multiplicity events in Phase 3 data”, M. Bertemes, G. Inguglia and I. Komarov, Belle II note: BELLE2-NOTE-TE-2019-023.
- 2019 “Search for an invisible  $Z'$  in  $e^+e^- \rightarrow \mu^+\mu^- +$  missing energy final states and background measurement for a search for a LFV invisible  $Z'$  in  $e^+e^- \rightarrow e^+\mu^- +$  missing energy final states with Phase 2 data”, G. Inguglia *et al.*, Belle II note: BELLE2-NOTE-PH-2019-002.
- 2018 “Performance of the CDC trigger for very low multiplicity studies in Phase 2 data”, G. Inguglia and I. Komarov, Belle II note: BELLE2-NOTE-TE-2018-017.
- 2016 “Search for the long lived dark photon decaying to  $l^+l^-$ ”, G. Inguglia, Belle note: BN1423.
- 2012 “SuperB Preliminary Vertexing Sensitivity Studies at the Charm Threshold”, A. Bevan and G. Inguglia, SuperB internal note: SBPHY2012020.

## List of selected invited presentations at international conferences

- 2022 IPPP Beyond flavour anomalies, What other LFU ratios will add, Durham.
- 2021 Les Rencontres de Moriond QCD, latest results in  $\tau$  and dark sector physics at Belle II.
- 2019 La Thuile 2019: “Dark Sector Physics Within Belle II”.
- 2017 ALPS2017: “Dark sector searches at Belle and Belle II”.
- 2016 IPA 2016 Orsay, review talk: “Experimental dark forces searches summary”.
- 2016 ICHEP 2016 Chicago, invited talk: “Studies of dark sector and  $B$  decays involving  $\tau$  at Belle and Belle II”.
- 2012 La Thuile 2012: “The time-dependent  $CP$  violation in charm”.

### List of selected invited seminars

- 2021 The InterLeptons project and the search for new fundamental interactions at Belle II, Atom Institute, AT (remote).
- 2020 The Belle II experiment, status and prospects for new physics searches, Zymanyi School 2020, HU (remote).
- 2020 Search for new fundamental interactions at Belle II, University of Vienna, AT (remote).
- 2020 Search for new interactions at Belle II, Birmingham University, UK (remote).
- 2019 Hunting for new interactions at Belle II, University of Siegen, Germany.
- 2018 Light dark matter searches at collider, Univerista' di Roma Tre, Roma, Italy.
- 2016 The search for dark forces and particles at Belle and Belle II, HEPHY-Vienna, Austria.
- 2015 Searches for Dark Forces and Particles at Belle and Belle 2: Status and Prospects, Queen Mary University of London, UK.
- 2014 Phenomenology and possible signatures of dark photon in  $e+e-$  collisions, University of Hawai'i, Honolulu, US.

### List of selected outreach talks

- 2021 InterLeptons: How Anomalies In Data Will Reveal The Future Of The Universe, Wien Planetarium Webinar.
- 2019 Representing the Invisible, Translating Dark Matter, documentary interview released for Art & Science project, the University of Applied Arts of Vienna, 2019.
- 2018 Dark Matter Day 2018, Vienna, presentation of Belle II Virtual Reality, event organizer.
- 2017 Dark Matter Day 2017, public lecture, Dark Matter at Belle II, event organizer.
- 2017 WAA Jahrestagung 2017, invited public lecture, "The fate of antimatter: can the Belle II experiment reveal what happened to the antimatter Universe?".
- 2013 Understand the Higgs boson at Royal Society Summer Science Exhibition, "The Higgs boson and the ATLAS experiment: demonstration", London, UK.

### Organisation of scientific meetings

- 2021 Chair of *Anomalies and Precision in the Belle II Era*, Vienna, September 2021.
- 2020-2022 Chair of IPA 2020 (Interplay between Particle and Astroparticle physics), Vienna.
- 2019 Chair of *Z' and exotic searches at Belle II*, Vienna, April 2019.
- Since 2017 Organizing Committee of ALPS (an Alpine LHC Physics Summit), Obergurgl.

### Organisation of outreach events

- Since 2017 Dark Matter Day, Vienna.