J.V. (Joris) van Heijningen

Instrumental physicist

Centre for Cosmology, Particle Physics and Phenomenology, 2 ch. de Cyclotron, Louvain-la -Neuve, B-1348, Belgium

+31 651746586

my LinkedIn

joris.vanheijningen@uclouvain.be

About me

Gravitational wave (GW) scientist and manager of 886 k€ in research funds. I have worked at CERN, SLAC and the Virgo and KAGRA gravitational wave observatories. The highlight of my Ph.D. has been the development of an interferometrically read out accelerometer, which is the world's most sensitive inertial sensor to date between 8-100 Hz. Following my 2020 proposal, my team is developing a cryogenic superconducting update of the sensor design to install in Einstein Telescope (ET) and as seismic sensor in the Lunar Gravitational-wave Antenna (LGWA). Additionally, I have taught undergraduate (*e.g.* particle physics) and postgraduate (GW instrumentation) courses. I have personally designed the GW course including experimental lab exercises. Finally, I have benefited from the timing of the first detection of GWs, which gave ample opportunities for outreach; I gave 10 public seminars and had a national TV appearance in The Netherlands.

Skills: Matlab, ANSYS, Finesse (GW optical sims), general CAD, Mathematica, MS Office

Experience

2020-now Research scientist — UCLouvain
Cryogenic superconducting inertial sensor and vibration isolation development, and mode mismatch mitigation using phase cameras

2018-2020 Postdoctoral research associate — University of Western Australia
Novel Euler spring development, mode mismatch mitigation for an 80 m suspended 2 μm silicon power recycled cavity and teaching courses

2017-2018 Junior researcher — Nikhef
Continue Ph.D. tasks and maintenance of Nikhef systems at the Virgo site

2012 Visiting physicist — Stanford University
Simulation and manufacturing of Silicon detectors for photon science at the SLAC National Accelerator Laboratory - awarded with 9.5/10

Education

2013-2017 Ph.D. in Physics — VU University Amsterdam
Seismic attenuation systems and optical inertial sensors for the Advanced Virgo and KAGRA GW detectors - supervisor: prof. Jo van den Brand

2010-2012 M.Sc. Applied Physics — Delft University of Technology
Thesis work on Rasnik and Rasdif optical alignment systems at Nikhef and CERN - supervisor: prof. Teun Klapwijk

2005-2009 B.Sc. Applied Physics — Delft University of Technology
Thesis work on Perturbed Angular Correlation (PAC) of gamma cascades at the Reactor Institute Delft - supervisor: dr. Dan DeVries

Teaching

2021 Lecturer — UCLouvain
Ph.D. level GW instrumentation - 4 lectures

2019-2020 Lecturer — University of Western Australia
Master's level GW instrumentation - designed the course and practical labs, and gave for two years - 12 lectures & 12 hours of labs (x2).

2019 Lecturer — University of Western Australia
Year 2 undergrad level particle physics - 12 lectures & 4 exercise classes

2018 Lecturer — University of Western Australia
Year 1 undergrad level "Our solar system" course - 4 lectures

2017 Lab assistant — VU University
Practical labs for 1st year Science and Business Innovation students

2014-2016 Teaching assistant — VU University
Exercise classes for 3rd year undergrad level General Relativity

Supervision

2021- Postdocs — UCLouvain
Francesca Badaracco, Elvis Ferreira on sensor development for ET/LGWA and Wang Yi on ETpathfinder suspension modelling

2021- Ph.D. thesis — UCLouvain
Ricardo Cabrita on Advanced Virgo optical mode mismatch mitigation and thermal compensation control using simulation and phase cameras

2018-2020 Ph.D. thesis — University of Western Australia
Vahid Jaberian on optical mode matching and characterisation of world's largest silicon mirrors

2018-2020 M.Sc. thesis — University of Western Australia
Conor Hanavan and Zhonghao Qing on LIGO-style DAQ systems

2014-2017 B.Sc. thesis — Twente University/ University of Amsterdam
Thomas Hoen, Dorine Schenk, Sjors Verhaar & Sizar Aziz on various different forms of inertial sensing

Funding

2022 — Proj. de Recherche for 396 k€ — Fonds Nat. de la Recherche Scientifique
Led proposal with ULiège, which funds a Ph.D. student working on superconducting inertial sensors and a cryogenic seismicly isolated test facility

2022 — LIEF grant for 555 kAU$ — Australian Research Council
A revised submission of a proposal I started in 2019 on a suspended cryogenic optical characterisation facility by an international team

2021-2022 — IISN grant for 203+22 k€ — Fonds National de la Recherche Scientifique
Led the instrumentation part of a 3-university proposal on mode mismatch mitigation consisting of one PhD student and optical equipment.

2021 — MISTI seed funding for 25 k€ — Massachusetts Institute of Technology
Led a collaboration between MIT's GW group and mine on final stage suspension development for future GW detectors

2021 — BEWARE grant for 208 k€ — Wallonie Recherche SPW
Personally forged and leading a collaboration with a company on superconducting actuators - scored 89.3/100 (highest in call)

2020 — TVA retour grant for €12 k€ — UCLouvain
Successful internal proposal for first DAQ system to get started

2019 — Two travel awards and 1 visitor grant totalling 6.5 kAU$ — OzGrav
Support towards conference attendance in Italy, a visit to the University of Melbourne and a visit of a professor to UWA

Awards

2021 — Runner-up of pitch competition — German TU9 Innovation Week
Pitched proposal to extract wave energy using GW technology

2021 — Winner of pitch competition — Falling Walls Amsterdam
Pitched the Lunar Gravitational-wave Antenna in 2:30 minutes

2016 — The 2016 Special breakthrough prize in fundamental physics
"For the observation of gravitational waves, opening new horizons in astronomy and physics" - with members of the LIGO Virgo Collaboration

Selected scientific presentations

2022 — Selected through abstracts — 16th Vienna Conf. on Instr. (remote)
A cryog. supercond. inert. sensor for terrestrial and lunar GW detection

2021 — Invited talk — 1st international workshop for GW detection on the Moon
Watt's linkage for lunar gravitational wave detection, Cascina, Italy

2021 — Selected through abstracts — 17th TAUP conference (remote)
CSIS: a Cryogenic Superconducting Inertial Sensor

2021 — Selected through abstracts — 14th Amaldi GW conference (remote)
fm/$\sqrt{}$Hz inertial sensing for future terrestrial and lunar GW detectors

2019 — Selected through abstracts — 1st KAGRA-Virgo-3G meeting
Geometric contoured Euler springs for vertical vibration isolation in future gravitational wave detectors, Perugia, Italy

2018 — Selected through abstracts — IEEE Sensor Application Symposium (SAS)
A novel interferometrically read out inertial sensor for future gravitational wave detectors, Seoul, South Korea

2016 — Collaboration meeting — LIGO-Virgo collaboration meeting
Hydrogen migration in GAS blades due to hydrostatic stress gradients, Glasgow, United Kingdom

2016 — Selected through abstracts — 5th Dutch Gravitational Wave meeting
When will we have 3 gravitational wave detectors online? When 4?

2015 — Selected through abstracts — 13th Pisa Meeting on Advanced Detectors
Interferometric readout of monolithic accelerometer, towards the fm/$\sqrt{}$Hz

2015 Collaboration meeting — ELiTES collaboration meeting
Newtonian noise: survey of low seismic noise environments and sub-ng instrumentation, Tokyo, Japan

2014 Selected through abstracts — Tech. and Instr. for Particle Physics
Interferometric readout of monolithic accelerometer, towards the fm/$\sqrt{\text{Hz}}$

2013 Collaboration meeting — ELiTES collaboration meeting
OSEMs on the payload prototype of the Type B/Bp suspension for KAGRA

2012 Collaboration meeting — CXI collaboration meeting
Simulation and manufacturing of silicon microstrip detectors

2011 Collaboration meeting — CLiC collaboration meeting
Rasnik comparison to other alignment systems in the 2 m mock-up

Service and academic memberships

2021- Payload work package leader — Lunar Gravitational-wave Antenna
Coordinating R&D into the inertial sensor, cryocooler and testing strategy

2021- Deputy work package leader — ETpathfinder
Coordinating large and benchtop suspension with Alessandro Bertolini

2020- Co-chair — Einstein Telescope
Coordinating R&D for auxiliary optics suspensions

2018-2020 Departmental seminar organiser — University of Western Australia
Organising weekly seminar by local and visiting scholars

2020- Cosmic Explorer consortium member
2020- Lunar Gravitational-wave Antenna consortium member
2018-2020 LIGO Scientific Collaboration member
2018- Einstein Telescope consortium member
2013- Virgo Scientific Collaboration member

Extra-curricular and volunteering

2019- Scientist — Skype-A-Scientist
Designing and giving interactive classes over Skype to elementary and secondary school classes around the world

2018-2020 ECR committee — OzGrav
Coordinating webinars to guide Early Career Researchers (ECRs) in their career and organising an annual two-day national retreat

2016 Business Orientation Week — Nyenrode Business University
Course at Dutch business university focused on personal development

2016 PhD Master Class — ASML
Case solving at a nanolithography company. Selected through interviews

2014 Interaction program committee — Nikhef for TIPP 2014
Stimulating interaction during a 500-participant international conference

2014-2016 Maatje (Dutch for 'buddy') — Amsterdam Red Cross
Voluntary work, helping people strengthening their social network

2013-2016 Ph.D. council — Nikhef
Guarding the rights of and organising events for Nikhef's Ph.D. candidates

2012 Ultrafast X-ray Summer School — SLAC National Accelerator Laboratory
Workshop on photon science focussing on X-ray free electron lasers

2011 Strategy consultant business courses — BCG, McKinsey and Strategy&
Participant of BCG WFP (Rome), McKinsey Horizon (Barcelona) and Strategy& The Game (Amsterdam) - selected through case interviews

2006-2007 Executive Board — sailing school D.S.Z.V. "De Brielse Maas"
Full-time, responsible for building, terrain and motor boats and recruitment of sailing instructors - received university scholarship

Selected outreach activities

2021	Keynote speaker	TUDelft alumni event
	Online seminar on Einstein Telescope for ~100 alumni	
2019	Interview	Naked Scientists podcast
	Black hole collides with a neutron star - podcast associated with the BBC	
2017	National TV appearance	Public broadcaster NPO2
	Zwaartekrachtsgolven, Het Klokhuis (NTR) - helped write scripts, design demos and was 'physics expert' in the show	
2015-2017	Seminars	throughout the Netherlands
	Gave 10 seminars on the first detections of GWs at various audience levels and locations	
2014-2018	Demonstrations	throughout Europe
	Organisation, setting up and performing of demos for outreach at public and scientific events	

Languages	Dutch (native), English (fluent), Italian (intermediate), French (basic)
Hobbies	Playing saxophone, physics outreach, singing, cooking, running, biking