

# Joachim Pomper

BSc

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Austria

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📄 joachim-pomper.github.io/homepage/

🐦 JoachimPomper

🌐 Joachim-Pomper

## Personal information

Date of birth 22.04.1997

Nationality Austria

## Education

2020-now **Master studies in theoretical and computational physics**, University of Technology Graz (TUG) and University of Graz (KFU).

2016-2020 **Bachelor studies in technical physics**, University of Technology Graz (TUG) and University of Graz (KFU).  
Graduated with distinction (grade 1.0).

2007-2015 **School of general education**, BRG Petersgasse Graz.

2003 -2007 **Elementary school**, Sacré Coeur Graz.

### Summer school programs

14.03.2022 - **Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation**,  
25.03.2022 Galileo Galilei Institute.

## Teaching

01.10.2022- **Teaching assistant for advanced Quantum Mechanics**, *Institute of Theoretical*  
31.01.2023 *Physics of KFU-Graz*, Physics master course.  
Correcting homework and tutoring students in the subject of quantum mechanics.

01.10.2021- **Teaching assistant for statistical physics**, *Institute of Theoretical Physics of*  
31.01.2022 *KFU-Graz*, Physics master course.  
Tutoring and grading of first semester master students in statistical physics.

01.10.2021- **Teaching assistant for linear algebra**, *Institute of Applied Mathematics of TU-*  
31.01.2022 *Graz*, Physics Bachelor course.  
Tutoring and grading of first semester bachelor students in linear algebra.

01.3.2021- **Teaching assistant for differential forms in the context of electromagnetism**,  
30.06.2021 *Institute of Applied Mathematics of TU-Graz*, Mathematics master course.  
Researching, writing and preparing lecture notes for a mathematics master's program special topic lecture on differential forms in the context of electromagnetism.

- 01.3.2021- **Teaching assistant for vector-calculus**, *Institute of Applied Mathematics of TU-Graz*, Physics bachelor course.  
Tutoring and grading of second semester bachelor students in vector-calculus.
- 01.10.2020- **Teaching assistant for calculus**, *Institute of Applied Mathematics of TU-Graz*, Physics Bachelor course.  
Tutoring and grading of first semester bachelor students in basic calculus.
- 01.3.2019- **Teaching assistant for programming in physics**, *Institute of Computational Physics of TU-Graz*, Physics bachelor course.  
Tutoring students in basic Matlab programming.
- 01.10.2018- **Teaching assistant for linear algebra**, *Institute of Applied Mathematics of TU-Graz*, Physics bachelor course.  
Tutoring and grading of first semester bachelor students in linear algebra.
- 01.10.2017- **Teaching assistant for linear algebra**, *Institute of Applied Mathematics of TU-Graz*, Physics bachelor course.  
Tutoring and grading of first semester bachelor students in linear algebra.

## Work

### Part-time jobs

- 01.10.2019- **Student trainee**, *BEST - Bioenergy and Sustainable Technologies, Area for automation and control*, <https://best-research.eu>.  
30.09.2020  
Primarily focused on testing and developing software for hydraulic and thermal simulation of buildings and district heating grids

### Internships

- 05.08.2018 - **Internship**, *BEST - Bioenergy and Sustainable Technologies, Subarea 4.2*.  
30.09.2018  
Primarily focused on quality analysis of prediction models for a model predictive controller.

## Languages

German Mother tongue  
English fluent

## Computer knowledge

### Programming languages

Matlab	Advanced knowledge	<i>work experience</i>
Python	Basic knowledge	<i>university course</i>
Julia	Advanced knowledge	<i>work experience</i>
C++	Basic knowledge	<i>university course</i>
Mathematica	Basic knowledge	<i>self-taught</i>

### Organization

Microsoft Office Basic knowledge  
Latex Advanced knowledge, used for articles and presentations

Zotero For structured literature management  
Git For software version control

## Conference talks

I have had the pleasure to give a talk in the parallel sessions of two conference, one at international level, which took place in Sydney in Australia.

DSU2022 **Composite dark matter from non-abelian gauge theories with real representations.**

Presentation of results of my master's thesis

ÖPG2022 **Low energy effective description of dark  $Sp(4)$  theory with matter in non fundamental representation.**

Presentation of preliminary results of my master's thesis

## Project selection from my time as a student

Bachelor thesis **Analytische Berechnung der spontanen Magnetisierung von isotropen homogenen Ising Ferromagneten unter der Verwendung von Graßmann Zahlen.**

Supervisor: Univ.-Prof. Dipl.-Phys. Dr.rer.nat. Wolfgang von der Linden

Master thesis (WIP) **Dark matter from an  $Sp(4)$  gauge theory with fermions in the antisymmetric tensor representation.**

Supervisor: PD. Dr. Suchita Kulkarni

Uni course project **A simple way to explain phenomena at the horizon of a static black hole.**

Supervisor: Univ.-Prof. Dr.rer.nat. Reinhard Alkofer

Uni course project **Particle creation in an expanding universe.**

Supervisor: Univ.-Prof. Dr.rer.nat. Reinhard Alkofer

Uni course project **Functional renormalization group approach for interacting Dirac fermions, Wetterich equation applied to the Gross-Neveu-Model.**

Supervisor: Univ.-Prof. Dr.rer.nat. Reinhard Alkofer

For more information look at my personal website.

## Further presentations during my time as a student

Besides the presentations above I also gave a talk in the institutes master seminar.

Master seminar **Introduction to dark matter phenomenology.**

General introduction to the topic of dark matter

Furthermore, I have gathered experience in reading, communicating and discussing research by presenting papers in my research groups journal club. Seven of the papers I presented are stated in terms of their arXiv numbers below.

[arXiv:hep-ph/2205.08088], [arXiv:gr-qc/1111.4824], [arXiv:gr-qc/0507028], [arXiv:hep-ph/2112.03755], [arXiv:astro-ph/1706.07433], [arXiv:hep-ph/1402.5143], [arXiv:hep-ph/1312.3325], [arXiv:hep-th/1803.07585], [arXiv:hep-th/9602093]

## Transcript of records



Matrikelnummer

**01530093**

Kennzeichnung des Studiums

**UF 033 678**

## Abschlusszeugnis

ausgestellt von der Technischen Universität Graz

FAMILIEN- oder NACHNAME Vorname(n)	Geburtsdatum
<b>POMPER Joachim</b>	<b>22.04.1997</b>
Studium	
<b>Bachelorstudium</b>	
<b>Physik</b>	
[gemeinsames Studium mit der Universität Graz im Rahmen von NAWI Graz]	
Gesetzliche Grundlage	
<b>Universitätsgesetz 2002, BGBl. I Nr. 120/2002 in der geltenden Fassung</b>	
Gesamtbeurteilung	
<b>mit Auszeichnung bestanden</b>	

Prüfungsfach	ECTS-Credits	Sem.-Std.	Datum	Beurteilung
Einführung in die Physik	11,00	--	04.07.2017	sehr gut (1)
Experimentalphysik	18,00	--	02.10.2017	sehr gut (1)
Mathematische Methoden, Grundlagen	18,00	--	22.06.2017	sehr gut (1)
Experimentelle Methoden, Grundlagen	11,50	--	02.02.2018	sehr gut (1)
Mathematische Methoden, Fortgeschrittene Techniken	21,50	--	06.07.2018	sehr gut (1)
Aufbau der Materie	13,00	--	25.06.2020	sehr gut (1)
Theoretische Mechanik und Quantenmechanik	19,50	--	05.07.2018	sehr gut (1)
Elektrodynamik und Thermodynamik	15,50	--	12.02.2019	sehr gut (1)
Wissenschaftliches Arbeiten	8,00	--	22.09.2020	sehr gut (1)
Vertiefungsrichtung Technische Physik:				
Grundlagen der Technischen Physik	18,00	--	14.07.2020	sehr gut (1)
Praktische Vertiefung der Technischen Physik	16,00	--	01.08.2019	sehr gut (1)
Freifach	10,00	--	24.06.2020	mit Erfolg teilg.

C 365197727

Abschlussdatum	Für den Vizerektor für Lehre
<b>22.09.2020</b>	<b>Univ.-Prof. Dipl.-Phys. Dr.rer.nat. Wolfgang von der Linden, Studiendekan</b>

Beurteilung: sehr gut (1), gut (2), befriedigend (3), genügend (4), nicht genügend (5);  
mit Erfolg teilgenommen, ohne Erfolg teilgenommen

Gesamtbeurteilung: mit Auszeichnung bestanden, bestanden, nicht bestanden

Technische Universität Graz: Abschlusszeugnis erstellt am 23.09.2020

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Matriculation number ID of degree programme

01530093

UF 033 678

# Transcript

Last name, first name(s) <b>Pomper, Joachim</b>	Date of birth <b>22.04.1997</b>
Degree programme <b>Bachelor's programme; Physics (as an extramural student)</b>	

## The following examinations have been taken:

Course/subject/module: Number/semester/type/title	ECTS	Semester hours WS SS		Date	Assessment
PHYA10 16W Orientation lecture Introducton to Bachelor Study of Physics	0,50	0,50	---	2016-10-05	successfully completed
PHYB10 16W Lecture Experimental Physics I (Mechanics, Thermodynamics)	6,00	4,00	---	2017-02-06	excellent (1)
PHYC30 16W Lecture Differential- and Integral Calculations	6,00	4,00	---	2017-02-07	good (2)
PHYB30 17S Lecture Experimental Physics II (Electricity, Magnetism, Optics)	6,00	---	4,00	2017-10-02	excellent (1)
PHYG20_2UB 17W Practical Practical Exercises in Theoretical Mechanics	3,00	2,00	---	2018-02-05	excellent (1)
PHYE30UB 17W Lecture Functional analysis and partial differential equations	6,00	4,00	---	2018-02-08	excellent (1)
PHYF10UB 17W Lecture Atomic, nuclear and particle physics	6,00	4,00	---	2018-03-12	excellent (1)
PHYG40_2UB 18S Practical Exercises on Quantum Mechanics	4,00	---	2,00	2018-06-26	excellent (1)
PHYG30UB 18S Lecture Quantum Mechanics	6,50	---	4,00	2018-07-05	good (2)
MAB01012UB 17W Lecture Analysis 1	7,50	5,00	---	2018-10-18	good (2)
PHYH40UB 18W Practical Practical Exercises in Thermodynamics	2,00	1,00	---	2019-01-31	excellent (1)
PHYI10UB 18W Seminar Academic Writing and Presentation Techniques	2,00	2,00	---	2019-01-31	excellent (1)
PHYH30UB 18W Lecture Thermodynamics	3,00	2,00	---	2019-02-12	excellent (1)
PHYA70UB 19S Lecture Programming in Physics: C++ and Mathematica	2,00	---	2,00	2019-07-09	excellent (1)
PHYA80UB 19S Practical Exercises to Programming in Physics: C++ and Mathematica	3,00	---	2,00	2019-07-09	excellent (1)
MAT211UB 19W Practical Measure and Integration Theory	1,00	0,50	---	2020-01-31	excellent (1)



# Transcript

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Degree programme <b>Bachelor's programme; Physics (as an extramural student)</b>	

MAT210UB      19W   Lecture Measure and Integration Theory	3,50	2,50	---	2020-02-25	excellent (1)
MAT156UB      20S   Lecture/Practical Programming in C++	6,00	---	4,00	2020-06-24	excellent (1)
Total	74,00	49,50			

Date <b>24.06.2022</b>	Academic Affairs
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UF 066 682

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Last name, first name(s) <b>Pomper, Joachim</b>	Date of birth <b>22.04.1997</b>
Degree programme <b>Master's programme; Physics (as an extramural student)</b>	

### The following examinations have been taken:

Course/subject/module: Number/semester/type/title	ECTS	Semester hours		Date	Assessment
		WS	SS		
PHU001UB 20W Lecture Statistical Physics	4,00	2,00	---	2020-11-24	excellent (1)
PHM509UB 20W Lecture/Practical Computational Methods in Solid State Physics	3,00	2,00	---	2021-02-11	excellent (1)
PHU012UB 20W Lecture Advanced Statistical Physics	3,00	2,00	---	2021-02-12	excellent (1)
PHM508UB 20W Lecture/Practical Monte-Carlo Methods	3,00	2,00	---	2021-02-26	excellent (1)
PHM500UB 20W Lecture Advanced Mathematical Methods	4,50	3,00	---	2021-06-04	excellent (1)
PHM501UB 20W Practical Advanced Mathematical Methods	1,50	1,00	---	2021-06-04	excellent (1)
PHM504UB 21S Lecture Advanced Quantum Mechanics II	3,00	---	2,00	2021-06-24	excellent (1)
PHM503UB 21S Practical Quantum Field Theory	1,50	---	1,00	2021-07-05	excellent (1)
PHM502UB 21S Lecture Quantum Field Theory	4,50	---	3,00	2021-07-16	excellent (1)
PHM525UB 21S Lecture Hadron Physics	3,00	---	2,00	2021-07-29	excellent (1)
PHM524UB 21S Projekt Project in: "Foundations of Particle Physics"	3,00	---	2,00	2021-07-30	excellent (1)
PHM001UB 21W Lecture Introduction to General Relativity and Cosmology	3,00	2,00	---	2021-10-14	excellent (1)
PHM012_1UB 21W Seminar Master Seminar in the Area of the Master's Thesis (Particle Physics)	2,00	2,00	---	2022-02-08	excellent (1)
PHM520UB 21W Lecture/Practical Quantum Field Theory 2: Gauge Theories	6,00	4,00	---	2022-02-12	excellent (1)
PHM528UB 21W Projekt Project in: "Phenomenology of Particle Physics"	3,00	2,00	---	2022-02-23	excellent (1)
PHM802UB 21S Lecture Astroparticle Physics	3,00	---	2,00	2022-02-25	excellent (1)

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PHM506UB      21W    Lecture Basic Concepts in Solid-state Theory	3,00	2,00	---	2022-02-28	excellent (1)
Total	54,00	36,00			

Date <b>24.06.2022</b>	Academic Affairs
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# Transcript

Last name, first name(s) <b>Pomper, Joachim BSc</b>	Date of birth <b>22.04.1997</b>
Degree programme <b>Bachelor's programme; Physics (as a degree student)</b>	

## The following examinations have been taken:

Course/subject/module: Number/semester/type/title	ECTS	Semester hours		Date	Assessment
		WS	SS		
PHYA30 16W Lecture/Practical Introduction to Mathematical Methods	1,00	1,00	---	2016-11-04	excellent (1)
PHYA20 16W Lecture Concepts and Applications of Modern Physics	1,50	1,50	---	2017-01-31	excellent (1)
PHYC20_1 16W Practical Linear Algebra	3,00	2,00	---	2017-02-27	excellent (1)
PHYC40_1 16W Practical Calculus	3,00	2,00	---	2017-02-27	excellent (1)
PHYA40 16W Lecture Introduction to Basic Chemistry	3,00	2,00	---	2017-03-01	excellent (1)
PHYC10 16W Lecture Elementary Mathematical Methods: Linear Algebra	3,00	2,00	---	2017-03-01	excellent (1)
PHYB20_1 16W Practical Experimental Physics I (Mechanics, Thermodynamics)	3,00	2,00	---	2017-03-08	excellent (1)
PHYC50 17S Lecture/Practical Ordinary Differential Equations	3,00	---	2,00	2017-06-22	excellent (1)
PHYD10_1 17S Lecture/Practical Introduction in measuring techniques	2,50	---	2,00	2017-06-26	excellent (1)
PHYE20_1 17S Practical Vector Analysis	3,00	---	2,00	2017-06-28	excellent (1)
PHYA50 17S Lecture Programming in Physics: Matlab	2,00	---	2,00	2017-07-04	excellent (1)
PHYA60 17S Practical Programming in Physics: Matlab	3,00	---	2,00	2017-07-04	excellent (1)
PHYD20_1 17S Laboratory practical Laboratory Course 1 (Mechanics and Thermodynamics)	3,00	---	3,00	2017-07-06	excellent (1)
PHYB40_1 17S Practical Experimental Physics II (Electricity, Magnetism, Optics)	3,00	---	2,00	2017-07-19	excellent (1)
PHYD30UF 17W Laboratory practical Laboratory Course 2 (Electricity Magnetism and Optics)	6,00	5,00	---	2018-02-02	excellent (1)
PHYG10UF 17W Lecture Theoretical Mechanics	6,00	4,00	---	2018-02-06	excellent (1)

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PHYE40_1UF 17W Practical Functional Analysis and Partial Differential Equations	3,00	2,00	---	2018-02-19	excellent (1)
PHYL10UF 18S Lecture Cryo Technology, Vacuum Technology, and Analysis Methods	4,50	---	3,00	2018-06-18	excellent (1)
PHYE60UF 18S Practical Probability Theory, Statistics and Data Analysis	2,00	---	1,00	2018-06-27	excellent (1)
PHYM30UF 18S Laboratory practical Introduction to mechanical applications	1,00	---	1,00	2018-06-28	excellent (1)
PHYE50UF 18S Lecture Mathematical Methods: Statistical Methods	3,00	---	2,00	2018-07-06	excellent (1)
PHYM20UF 18S Laboratory practical Electronics and Computer Supported Measurement Technique	2,50	---	2,00	2018-07-12	excellent (1)
PHYM10UF 18S Lecture Electronics and Computer Supported Measurement Technique	4,50	---	3,00	2018-12-13	excellent (1)
PHYH20UF 18W Practical Theoretical Electrodynamics	4,00	2,00	---	2019-02-01	excellent (1)
PHYH10UF 18W Lecture Theoretical Electrodynamics	6,50	4,00	---	2019-02-07	excellent (1)
PHYL30UF 18W Practical Computational Methods in Technical Physics	3,00	2,00	---	2019-03-05	excellent (1)
PHYL20UF 18W Lecture Computational Methods in Technical Physics	3,00	2,00	---	2019-03-12	excellent (1)
PHYF30UF 19S Practical Molecule and Solid State Physics Exercises	2,00	---	1,00	2019-06-25	excellent (1)
MAT152UF 19S Practical Analysis 2	3,00	---	2,00	2019-06-27	excellent (1)
PHYL50UF 19S Lecture/Practical Continuum and Fluid Mechanics	3,00	---	1,50	2019-07-04	excellent (1)
PHYM40UF 18W Laboratory practical Advanced Laboratory Technical Physics 1	4,00	2,50	---	2019-08-01	excellent (1)
PHYM50UF 19S Laboratory practical Advanced Laboratory Technical Physics 2	4,00	---	2,50	2019-08-01	excellent (1)
MAT151UF 19S Lecture Analysis 2	7,50	---	5,00	2019-10-28	excellent (1)
MAT208UF 19W Practical Computational Mathematics 1	1,50	1,00	---	2020-01-29	excellent (1)
MAT202UF 19W Practical Analysis 3	3,00	2,00	---	2020-02-05	excellent (1)
PHYF20UF 20S Lecture Molecule and solid state-physics	5,00	---	3,00	2020-06-25	excellent (1)
PHYL40UF 20S Lecture Physical Principles of Materials Science	4,50	---	3,00	2020-07-14	excellent (1)
MAT258UF 20S Practical Introduction to Functional Analysis	1,50	---	1,00	2020-08-28	excellent (1)
PHYI20_5UF 20S Project Bachelorarbeit	6,00	---	1,00	2020-09-22	excellent (1)

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Total	131,00	86,00		
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Date <b>24.06.2022</b>	For the Rectorate: The Vice Rector for Academic Affairs: Univ.-Prof. Dipl.-Ing. Dr.techn. Stefan Vorbach
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## The following examinations have been taken:

Course/subject/module: Number/semester/type/title	ECTS	Semester hours		Date	Assessment
		WS	SS		
MAT207UF 19W Lecture Computational Mathematics 1	4,50	3,00	---	2020-11-03	excellent (1)
PHU002UF 20W Practical Statistical Physics	2,00	1,00	---	2021-01-22	excellent (1)
PHU004UF 20W Practical Advanced Quantum Mechanics	2,00	1,00	---	2021-01-27	excellent (1)
PHU003UF 20W Lecture Advanced Quantum Mechanics	4,00	2,00	---	2021-02-01	excellent (1)
MAT312UF 20W Practical Computational Mathematics 2	1,50	1,00	---	2021-02-02	excellent (1)
PHT508UF 21S Lecture/Practical Green's Functions in Many-Particle Physics	3,00	---	2,00	2021-07-05	excellent (1)
MAT656UF 21S Lecture Elective Subject Mathematics (Electromagnetism and Differential Forms)	3,00	---	2,00	2021-09-03	excellent (1)
MAT311UF 20W Lecture Ordinary Differential Equations	4,50	3,00	---	2021-09-24	excellent (1)
Total	24,50	15,00			

Date <b>24.06.2022</b>	For the Rectorate: The Vice Rector for Academic Affairs: Univ.-Prof. Dipl.-Ing. Dr.techn. Stefan Vorbach
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