

# Benny van Zuiden

## Physicist

### Personal & contact information

Full name	Dr. Benjamin Chai van Zuiden	Nationalities	-
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LinkedIn	benny-van-zuiden	Online	github, bitbucket, gitlab google scholar



### Profile

Challenges at the intersection of heavy mathematics and high performance computing excite me. With both an academic and corporate background I have extensive experience in mathematical modeling and algorithm design, finding solutions that get the job done. Once I am possessed by a problem, I use my hacker attitude to crack the puzzle by any means. I am looking for jobs that give me the opportunity to autonomously research and develop solutions to the problems at hand, together with like-minded colleagues. I also have experience in academic teaching, leading teams and sales, which I am always happy to use.

### Degrees

2013–2017	<b>Doctor of Philosophy (PhD)</b> in theoretical physics at Leiden University • Thesis title: <i>Topology and Geometry in Chiral Liquids</i> , promoter: prof. dr. V. Vitelli.	Leiden, NL
2011–2013	<b>Master of Science (MSc)</b> in theoretical physics at Leiden University • Thesis title: <i>Crystal Melting on Curved Surfaces</i> , promoter: prof. dr. V. Vitelli.	Leiden, NL
2007–2011	<b>Bachelor of Science (BSc)</b> in physics and astronomy at Leiden University • With additional graduate courses in mathematics and computational physics.	Leiden, NL
2001–2007	<b>VWO science oriented profile (nt+ng)</b> at J.S.G. Maimonides • Preparatory university education for exact and medical sciences.	Amsterdam, NL

### Skills

Throughout my career paths, I accumulated lots of skills in physics, mathematics and high performance computing – some of which mentioned below. This includes, researching and developing analytical models and algorithms for simulations, data processing and the like. Since 1997, I have gained experience in programming, system managing, making and hacking. For the majority of these years the (arch)linux environment is my operating system of choice and I have contributed and released to various open source projects.

Languages	Dutch & English (fluent), Hebrew (limited), French & German (basic)
Math	Calculus/analysis, linear algebra, statistics, combinatorics, complex analysis, vector calculus, differential geometry, discrete analysis, variational calculus, numerical algorithms, perturbation theory, dynamical systems and topology.
Physics	Computational physics, statistical mechanics, classical mechanics, signal processing, data analysis, quantum mechanics, special and general relativity, electrodynamics, soft condensed matter physics, active matter, field theory, particle physics, hard condensed matter physics, fluid dynamics and optics.
Programming	C/C++ (since 1999; C++ 98/11/14/17/20, STL, POSIX, OpenMP, pthread, CUDA, Eigen, Armadillo, xtensor, dlib, Boost, OpenCV, OpenSSL/LibreSSL, etc.), python (numpy, scipy, pandas, tensorflow, matplotlib, etc.), bash/zsh (AWK, sed, bc, etc.), Julia, make/cmake, rust, swig, php, javascript (node), html, css, VimL, $\TeX$ / $\LaTeX$ , svg, SQL, gnuplot, and qbasic.
Tools	git, gcc/clang, gdb/lldb, valgrind, afl, (neo)vim, ghidra, netcat, embedded avr/arm, emcc, etc.

## Employment Experience

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2020–present	<b>Senior Design Engineer</b> ASML <ul style="list-style-type: none"><li>Design and implement algorithms for nanometer scale wafer alignment.</li><li>Promotion from Design Engineer to Senior Design Engineer in 2021.</li></ul>	Eindhoven, NL
2018–2019	<b>Numerical Research Consultant</b> Digital Physics Consultancy <ul style="list-style-type: none"><li>Novel ODE solving/numerical integrating algorithms.</li></ul>	Amstelveen, NL
2017–2019	<b>C++14 Software Engineer</b> SQream Technologies <ul style="list-style-type: none"><li>Programming for a high performance and scalable GPU SQL database in C++14/CUDA,</li><li>White paper in for novel sequence compression algorithm,</li><li>Development of high speed connectivity framework in C++14,</li><li>Distinction for excellent work.</li></ul>	Tel Aviv, IL
2013–2017	<b>Doctoral Candidate</b> in Theoretical Physics at Leiden University <ul style="list-style-type: none"><li>Building and maintaining a numerical computer library written in C++11,</li><li>Assembling and maintaining a self built twenty-two-node computer cluster,</li><li>Chiral active liquids with self-rotation particle experiments with air hockey tables,</li><li>Active matter experiments with Kilobots (tiny table top robots),</li><li>Writing scientific papers collaboratively which are published in high impact journals,</li><li>System and code maintainer for group computational and numerical efforts,</li><li>Giving conference presentations and workshops.</li></ul>	Leiden, NL
July 2013	<b>Research assistant</b> at the Berkeley National Laboratory (lbl.gov) <ul style="list-style-type: none"><li>Simulating crystal melting on curved surfaces using CUDA GPU computer clusters,</li></ul>	Berkeley, CA, USA
2012–2016	<b>Teaching assistant (4×)</b> for computational physics at Leiden University <ul style="list-style-type: none"><li>Monte Carlo methods in statistical physics: Ising model, polymer physics etc.</li></ul>	Leiden, NL
2002–2013	<b>Manager, sales- and repairman</b> at bicycle shop (Dr. Beyk, Overtoom)	Amsterdam, NL
2005–2008	<b>IT support</b> , freelance	Amsterdam, NL
1995–2001	<b>Junior salesman</b> at Juwelier Briljant	Amstelveen, NL

## Extracurricular activities & volunteer work

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May 2017	<b>Staff member Beijing Study Trip</b> for De Leidsche Flesch <ul style="list-style-type: none"><li>Representing Leiden University department of physics for a travel group of 45 students.</li></ul>	Beijing, CN
August 2015	<b>Chaos Communication Camp</b> hacking conference <ul style="list-style-type: none"><li>Extensive exposure to embedded ARM programming and radio hacking.</li></ul>	Berlin area, DE
July 2015	<b>Boulder Summer School</b> Soft Matter In and Out of Equilibrium <ul style="list-style-type: none"><li>Teaching a workshop on differential geometry.</li></ul>	Boulder, CO, USA
2007–2013	<b>Freezing physics Benelux roadshow</b> at Stichting Rino <ul style="list-style-type: none"><li>Demonstrate and explain experiments with liquid nitrogen,</li><li>Coordinating and driving a team of volunteers to make a show happen.</li><li>Maintaining and developing experiments.</li></ul>	Leiden, NL

## Selected Publications

more on website or on LinkedIn

2017	A. Souslov, B. C. van Zuiden, D. Bartolo and V. Vitelli. <i>Topological Sound in active-liquid metamaterials</i> . <b>Nature Physics</b> , doi:10.1038/nphys4193.
2016	B. C. van Zuiden, J. Paulose, W. T. M. Irvine, D. Bartolo and V. Vitelli. <i>Spatiotemporal order and emergent edge currents in active spinner materials</i> . <b>Proceedings of the National Academy of Sciences (PNAS)</b> , doi:10.1073/pnas.1609572113.
2013	E. Páram, J. Vallamkondu, V. Koning, B. C. van Zuiden, P. W. Ellis, M. A. Bates, V. Vitelli and A. Fernandez-Nieves. <i>Stable nematic droplets with handles</i> . <b>Proceedings of the National Academy of Sciences (PNAS)</b> , doi:10.1073/pnas.1221380110.