

## Tatsam Garg

Master's Student  
Langen Group  
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<https://github.com/TatsamGarg>

Website

## EDUCATION

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<b>University of Stuttgart, Germany</b> <i>Master's in Physics</i>	<i>Expected 2023</i>
<b>Ashoka University, India</b> <i>Bachelor's in Physics (Honors)</i>	<i>2021</i>
<b>Birla Vidya Niketan, New Delhi, India</b> <i>Central Board of Secondary Education</i>	<i>2018</i>

## SELECTED AWARDS AND HONORS

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<b>Master's Fellowship</b> Fully funded masters, IMPRS-CMS, Max Planck Society	<i>Sept 2021 - Sept 2023</i>
<b>World Rank 15</b> International Theoretical Physics Olympiad	<i>2021</i>
<b>Academic Award for Physics</b> Ashoka University	<i>Class of 2021</i>
<b>Cum Laude</b> Latin Honors, Ashoka University	<i>2021</i>
<b>Dean's List</b> 4/4 GPA, Ashoka University	<i>Monsoon Sem 2020</i>
<b>Dean's List</b> 3.88/4 GPA, Ashoka University	<i>Spring Sem 2020</i>
<b>High-school Stream Topper</b> secured highest percentage in PCB/Physical Ed. cohort	<i>2018</i>
<b>Best Research Poster</b> The International Conference on Nano-biotechnology for Agriculture	<i>2017</i>

## CONFERENCES AND PUBLICATIONS

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"A scalable scanning transfer cavity laser stabilization scheme based on the Red Pitaya STEMLab platform", (with Langen group), under review.

Young Atom Opticians Conference, ICFO Barcelona, *Contribution talk*, 2023.

SAMOP, German Physical Society, *Attendee*, 2023.

International Conference on Nano-Biotechnology for Agriculture, TERI-Deakin India, *Poster presentation*, 2017.

Japan Super Science Fair, *Contribution talk and poster*, 2017

## EXPERIENCE AND PROJECTS

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<b>Master's Thesis, Langen Group</b> <i>Direct laser cooling of 138 Barium Monofluoride molecules</i>	<i>Nov 2022 - Present</i>
<ul style="list-style-type: none"><li>– Prepared the experimental setup for transversal laser cooling.</li><li>– Demonstrated optical cycling on the second repumping transition for the first time.</li><li>– Demonstrated optical cycling and high fidelity imaging for rare-isotopologue <math>^{136}\text{BaF}</math> for the first time.</li><li>– Characterised the forward velocity of the molecular beam using Doppler shifts.</li><li>– Built and maintained external cavity diode laser and tapered amplifier systems.</li></ul>	

<b>Student Assistant, Langen Group</b> <i>Nitrogen-vacancy center based magnetometry</i>	<i>Apr 2022 - Nov 2022</i>
<ul style="list-style-type: none"><li>– Built a test set-up magnetometer using NV centers in Diamond.</li><li>– Involved the use of diode lasers, optics, microwave generators and fields, and SCPI based control of FPGAs.</li></ul>	

**Independent Study Module, Ashoka University**

Jan 2021 - June 2021

*Experimentally studying flow and instability in viscous currents on a slope*

- Fluid dynamics experiments to characterise the build up and growth of instabilities in viscous fluid flows, supervised by Dr. Pramoda Kumar.
- Access the report [here](#).

**Independent Project, Prof. Vikram Vyas**

June 2020 - Dec 2020

*Computing Monte Carlo path integrals*

- Explored Monte Carlo path integral formulations for the quartic-anharmonic oscillator in the first phase of this work. Project report available [here](#).
- Extensive reading of classical string theory from undergraduate texts.
- Extensions to this work may implement the Monte Carlo approach to the classical open string Lagrangian and explore quark confinement using gauge-gravity duality.

**Science communication, International Union of Biological Sciences**

May 2020 - Dec 2020

*Lesson plan writer and climate science education content creator for TROP ICSU*

- Developed and published lesson plans and teaching modules for undergraduate and high-school teachers and students to teach Physics and Python Programming through the development of Climate Models.
- Published work [here](#) and [here](#).

**Independent Project, Prof. Shivani Krishna**

Dec 2019 - Jan 2020

*Individual-based mathematical modelling for ecology*

- Studied adaptive bee foraging behavior to stabilize rare plant species population in two-specie floral distributions
- Designed and conducted experiments. Presentation available [here](#).

**Internship, Nature Conservation Foundation (NCF)**

May 2019 - July 2019

*Snow leopard Population Estimation in Himachal Pradesh, India*

- Worked under Dr. Kulbhushansingh Suryawanshi's team for field work in camera trapping and terrain analysis, and conducted wildlife hunting and trade surveys.
- Part of a global project by the Snow Leopard Trust to estimate the global population of Snow Leopards.

**Independent Project, The Energy and Resources Institute (TERI)**

June 2017 - Nov 2017

*Developing pectin-based complex for heavy metal removal from Wastewater*

- Worked under the supervision of Dr. Nupur Mathur on developing pectin-based complexes to filter carcinogens, particularly hexavalent Chromium.
- Access poster [here](#)

**POSITIONS OF RESPONSIBILITY**

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**Deputy Head Boy**, Birla Vidya Niketan

2016-17

**President**, Model UN society, Birla Vidya Niketan

2016-17

**Head of Photography**, Unbound Magazine, Birla Vidya Niketan

2016-17

**TECHNICAL SKILLS AND INTERESTS**

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**Languages:** English (proficient), Hindi (native), German (beginner)**Computational Tools:** Python and Matlab; Numerical simulations- ODE and PDE methods, Monte Carlo methods, regression; SCPI interface**Optics:** Standard AMO lab experience - Tunable external cavity diode lasers, Ti:Sa lasers, Tapered amplifiers, modulation devices, cavities, fibre optics**Other Interests:** Music - *songwriting, guitar, piano, production*; Travel - *hiking, backpacking*; Photography; Theatre; Poetry