

Resume of Oliver Gutsche

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- Particle physicist conducting **leading edge research** for New Physics Beyond the Standard Model of Particle Physics
 - Multiple years of experience in analyzing high-energy collisions using a multitude of different techniques. One of my most noticeable publications is the [Observation of the Higgs Boson in 2012](#).
- **Leader in scientific computing**
 - Expert in object oriented software development, statistical data analysis methods and Monte Carlo simulation techniques as well as various optimization and machine learning techniques.
 - Deep experience in planning, developing, and operating distributed computing infrastructures that provide access to several hundred-thousand computing cores and hundreds of petabytes of disk space.
 - Intimately familiar with scientific grid sites, academic and commercial clouds and U.S. supercomputers.
 - Part of a worldwide community planning process for the software and computing infrastructure of the High Luminosity LHC (HL-LHC, 2016). Contributed to the [overview white paper of the community](#) and editor of the topical white paper about the future of [data analysis in High Energy Physics](#). My expertise in the community was acknowledged in 2020 when I was called upon to co-lead the [Computational Frontier](#) of the [Particle Physics Snowmass 2021 process](#).
- **U.S.CMS Software and Computing Operations Program manager** enabling analysis of LHC particle collisions in the U.S. for the 2500 physicist strong CMS collaboration.

Research Positions:

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|--------------------------|-------------------------|--|
| 09/2019 - Present | Senior Scientist | Fermi National Accelerator Laboratory (Fermilab) |
| 09/2014 - 08/2019 | Scientist | Fermi National Accelerator Laboratory (Fermilab) |
| 06/2009 – 09/2014 | Application Physicist I | Fermi National Accelerator Laboratory (Fermilab) |
| 06/2005 – 05/2009 | Research Associate | Fermi National Accelerator Laboratory (Fermilab) |
| 09/2001 – 02/2005 | Doctoral Candidate | Deutsches Elektronen Synchrotron (DESY) |

Education:

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|--------------|---|
| 2001-2005 | University of Hamburg, <i>Doctor of Natural Sciences</i> , Hamburg, Germany |
| Thesis title | <i>Measurement of beauty quark cross sections in photoproduction with the ZEUS experiment at the electron proton collider HERA</i> (thesis) |
| Advisors | Prof. Dr. Robert Klanner, Dr. Achim Geiser |

Assignments:

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|-------------------|---|
| 03/2019 - present | U.S. CMS Software and Computing Operations Program manager |
| 10/2019 - present | Associate Head of the Scientific Computing Division for CMS |

Research and Technical Experience

- Joined the CMS collaboration in 2005. Research focus: search for physics beyond the Standard Model at the LHC, especially for Supersymmetry and Dark Matter.
 - Founding member of an analysis group with members from Fermilab/UCSD/UCSB, focusing on final states with leptons.
 - Supervised several Fermilab postdoctoral researchers:
 - * Jacob Linac measuring top quark properties and searching for heavy top-like particles.
 - * Matteo Cremonesi searching for Dark Matter.

* Nick Smith analyzing Higgs boson decay channels, starting with the decay into two bottom quarks, and two charm quarks.

- Extensive experience in operating large distributed computing infrastructures: operated the entire CMS computing resources in LHC Run 1 leading up to the Higgs discovery with a team of 60 individuals distributed across the world
- Part of the worldwide community efforts to plan for the software and computing infrastructure for the High Luminosity LHC (HL-LHC): I was an integral part of the community planning process and my input was documented in the [Roadmap for HEP Software and Computing R&D for the 2020s](#). I was editor of the [HEP Software Foundation Community White Paper Working Group - Data Analysis and Interpretation](#). My expertise in the community was acknowledged in 2020 when I was called upon to co-lead the [Computational Frontier](#) of the [Particle Physics Snowmass 2021 process](#). Because the Snowmass process was delayed by one year, I needed to resign in 2022 due to previous high priority commitments. I oversaw the process till a successor was appointed.
- My recent research interest in computing infrastructure explores if analysis in HEP can be conducted more efficiently using tools developed and used by industry. I am exploring using toolkits like [Apache Spark](#) and similar technologies. I created a research group spanning researchers from Fermilab, CERN and the Universities Princeton, Padova and Vanderbilt. The [CMS Big Data Project](#) also very closely works together with industry in a project with [Intel](#) in the context of [CERN openlab](#). I also managed a Laboratory Directed Research and Development project (LDRD) to develop innovative technology for Big Data delivery to array-based analysis code, the [Striped Data Server for Scalable Parallel Data Analysis](#). These projects lead to various projects like a user front-end to columnar data tools [COFFEA](#) and supporting analysis activities funded through [IRIS-HEP](#).
- I am currently the U.S. CMS Software and Computing Operations Program manager enabling analysis of U.S. collaborators of the CMS experiment. I am overseeing the operation of the U.S. CMS Tier-1 site at Fermilab and 7 U.S. Tier-2 sites at Caltech, Florida University, MIT, University of Nebraska-Lincoln, Purdue University, UC San Diego, University of Wisconsin-Madison. I lead effort to administer the sites, maintain the computing infrastructure and conduct strategic R&D projects.
- In January 2020, the DOE [Center for Computational Excellence](#) was funded for a 3-year project to enable HEP experiments like ATLAS, CMS, DUNE, LSST, DESI and others to efficiently use HPC installations in the U.S. at the leadership class facilities at Argonne and Oakridge National Laboratories and NERSC at Lawrence Berkeley National Laboratory. I co-wrote the proposal to execute 4 sub-projects and I was appointed technical lead of the sub-project to investigate parallel portability solutions.

Selected Recent Publications in Physics and Computing

A.M. Sirunyan et al., **Search for dark matter produced in association with a Higgs boson decaying to a pair of bottom quarks in protonproton collisions at $\sqrt{s} = 13\text{TeV}$** , *Eur. Phys. J. C* 79 (2019) 280, doi:[10.1140/epjc/s10052-019-6730-7](#), arXiv:[1811.06562](#) [hep-ex]

V. Khachatryan et al., **Measurements of $t\bar{t}$ charge asymmetry using dilepton final states in pp collisions at $\sqrt{s} = 8\text{ TeV}$** , *Phys. Lett. B* 760 (2016) 365–386, doi:[10.1016/j.physletb.2016.07.006](#), arXiv:[1603.06221](#) [hep-ex]

A. Apresyan et al., **Detector R&D needs for the next generation e^+e^- collider**, (2023). <http://arxiv.org/abs/2306.13567>, arXiv:[2306.13567](#) [hep-ex]

M. Atif et al., **Evaluating Portable Parallelization Strategies for Heterogeneous Architectures in High Energy Physics**, (2023). <http://arxiv.org/abs/2306.15869>, arXiv:[2306.15869](#) [hep-ex]

B. Bockelman et al., **IRIS-HEP Strategic Plan for the Next Phase of Software Upgrades for HL-LHC Physics**, (2023). <http://arxiv.org/abs/2302.01317>, arXiv:[2302.01317](#) [hep-ex]

V.D. Elvira et al., **The Future of High Energy Physics Software and Computing**, in: **Snowmass 2021**, 2022. <http://arxiv.org/abs/2210.05822>, arXiv:[2210.05822](#) [hep-ex]

G. Cerati et al., **Snowmass Computational Frontier: Topical Group Report on Experimental Algorithm Parallelization**, (2022). <http://arxiv.org/abs/2209.07356>, arXiv:2209.07356 [hep-ex]

M. Bhattacharya et al., **Portability: A Necessary Approach for Future Scientific Software**, in: **Snowmass 2021**, 2022. <http://arxiv.org/abs/2203.09945>, arXiv:2203.09945 [physics.comp-ph]

N. Smith et al., **Coffea: Columnar Object Framework For Effective Analysis**, *EPJ Web Conf.* 245 (2020) 06012, doi:[10.1051/epjconf/202024506012](https://doi.org/10.1051/epjconf/202024506012), arXiv:2008.12712 [cs.DC]

J. Albrecht et al., **A Roadmap for HEP Software and Computing R&D for the 2020s**, *Comput. Softw. Big Sci.* 3 (2019) 7, doi:[10.1007/s41781-018-0018-8](https://doi.org/10.1007/s41781-018-0018-8), arXiv:1712.06982 [physics.comp-ph]

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- Full List of Physics Publications with Major Personal Contributions can be found [here](#).
 - Full List of Computing Publications with Major Personal Contributions can be found [here](#).
 - Full List of Presentations and Talks can be found [here](#).
 - Full CV can be found [here](#).