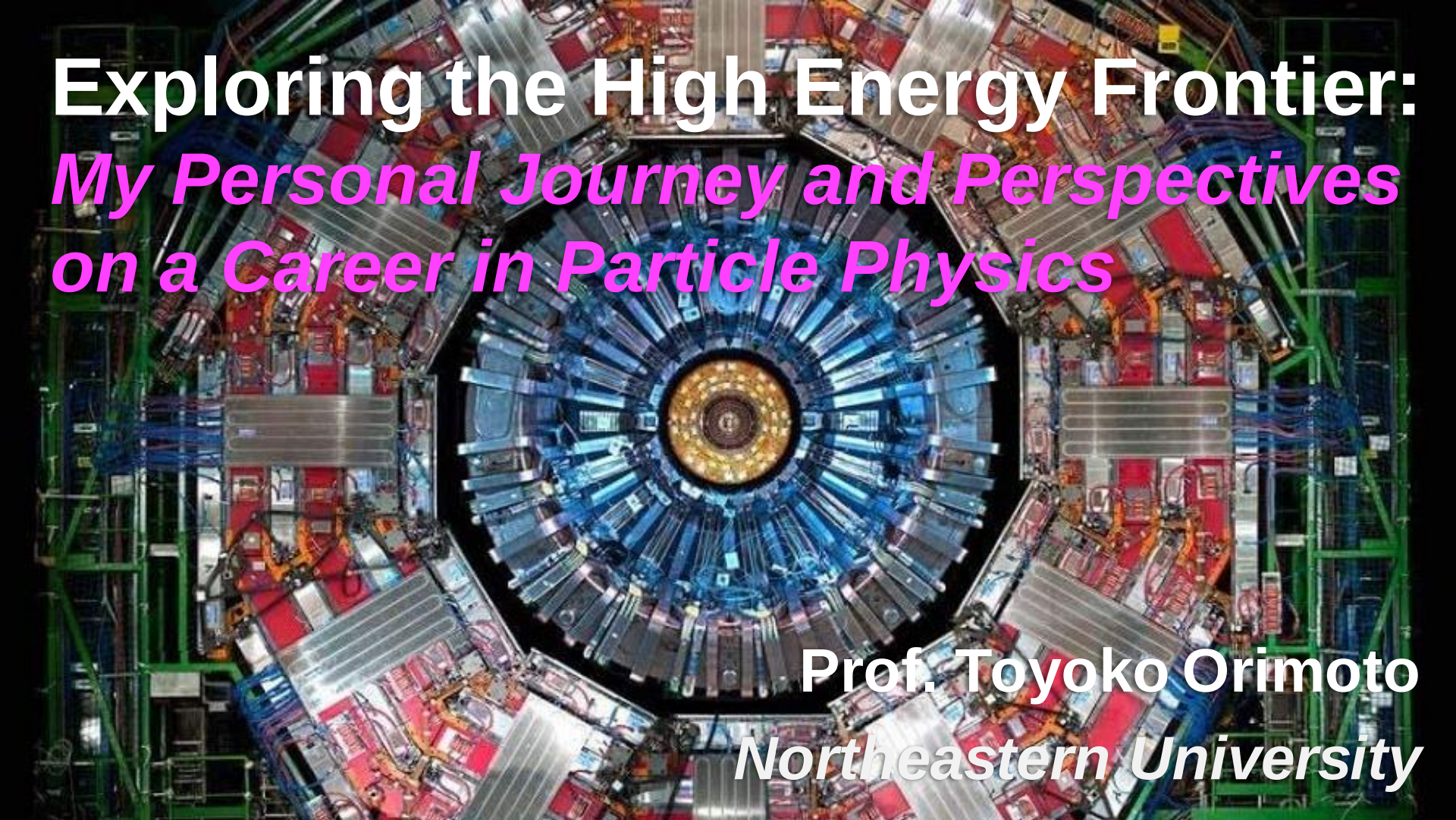


Exploring the High Energy Frontier:

My Personal Journey and Perspectives on a Career in Particle Physics

Prof. Toyoko Orimoto

Northeastern University


Personal Journey

Who Am I?

- Toyoko Orimoto
- Associate Professor of Physics
- Particle Physicist
- Los Angeleno turned Bostonian
- 2nd gen Japanese American
- Woman of Color
- Mother to two young children
- Teacher, advisor, mentor

Who Am I / Who Are We?

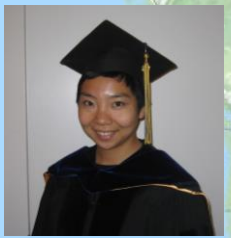
We all have many identities, and we bring those identities with us wherever we go, including into the lab, classroom, interview, etc

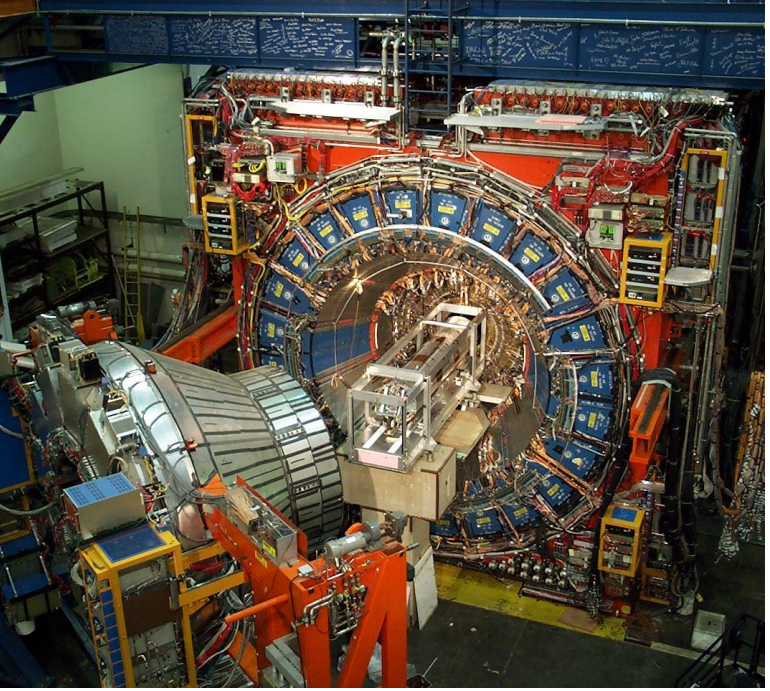
Toyoko Orimoto

- **BA (May 2000):** University of California, Berkeley
  - Research Experiences with D-Zero & ATLAS
- **PhD (Dec 2006):** University of California, Berkeley
  - Thesis: “Study of rare B-meson decays related to the CP observable sin(2β + γ) at the BaBar experiment”

- **Postdoctoral Work:** 2006-2009 Robert A. Millikan Postdoctoral Fellow, Caltech; 2009-2012 CERN Fellow
- **Professorship:** 2012-2019: Assistant Professor, Northeastern University; 2019-present: Associate Professor, Northeastern University
- **Current Collaboration:** CMS, member since 2006
- **Roles:** CMS ECAL System Manager; CMS Diversity & Inclusion Office co-chair
- **CV:** https://cos.northeastern.edu/wp-content/uploads/2023/04/CV_ToyokoOrimoto_March2023.pdf

How Did I Get Here?

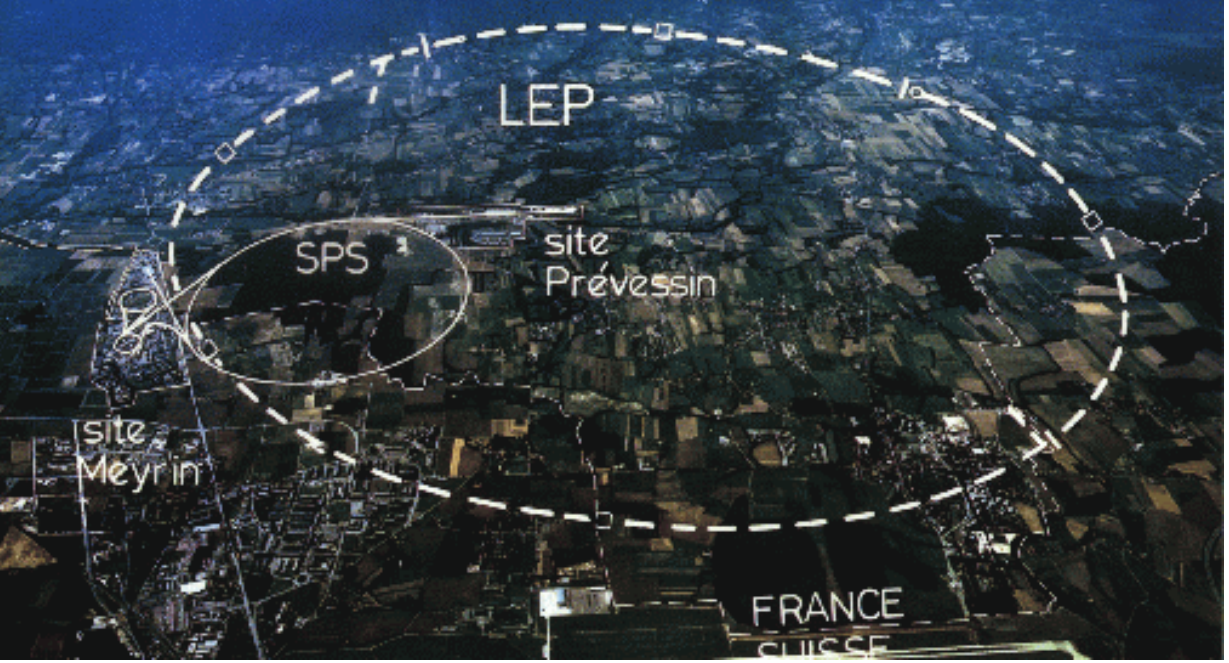




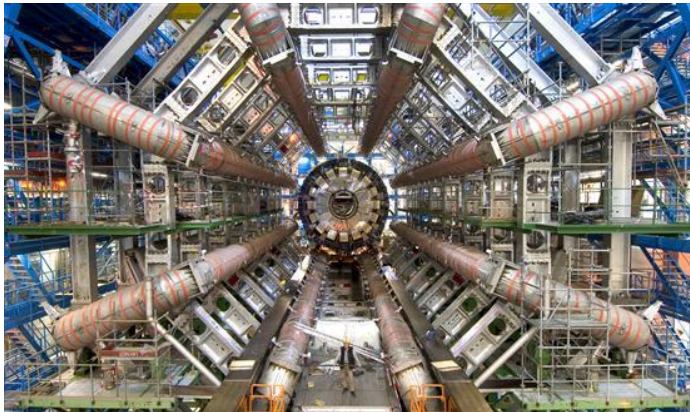
1995: Discovery of the Top Quark

University of California Berkeley

1996-2000: BA



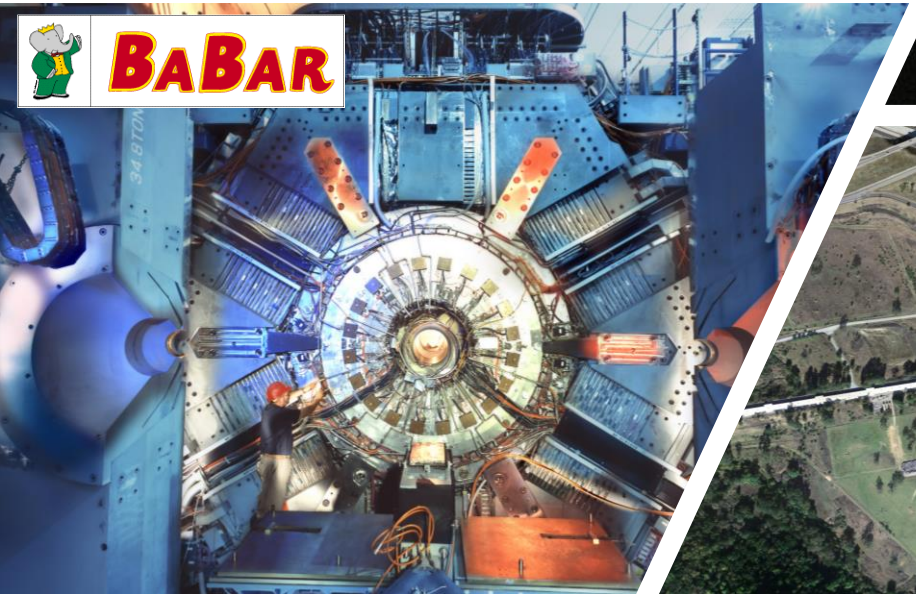
Undergraduate Research: D-Zero & ATLAS Experiments

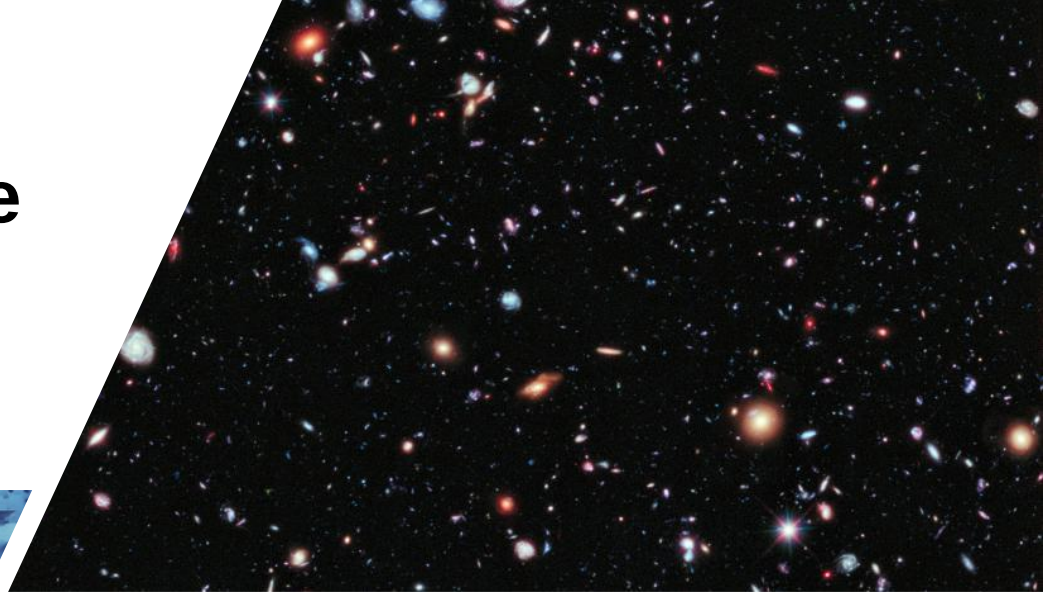


University of California Berkeley

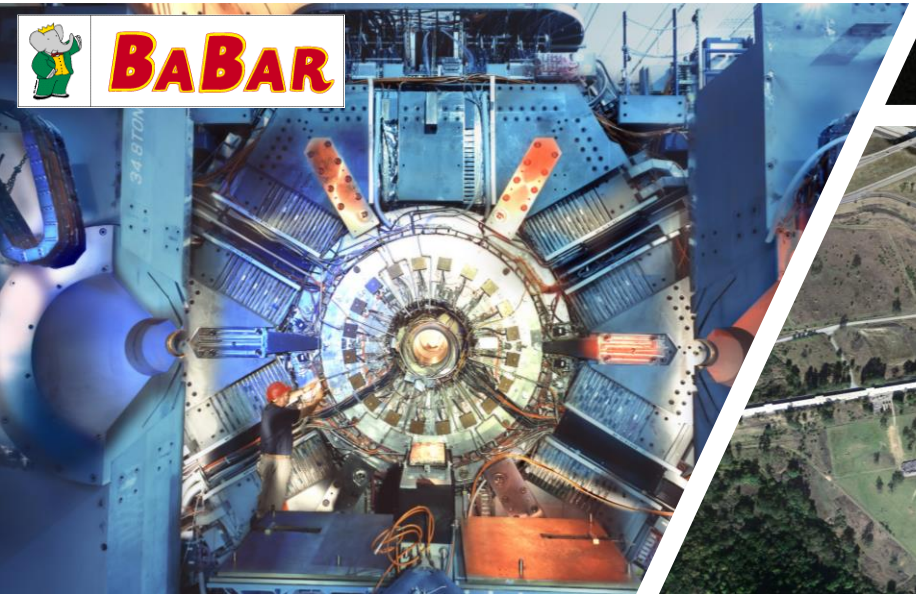
2000-2006: PhD

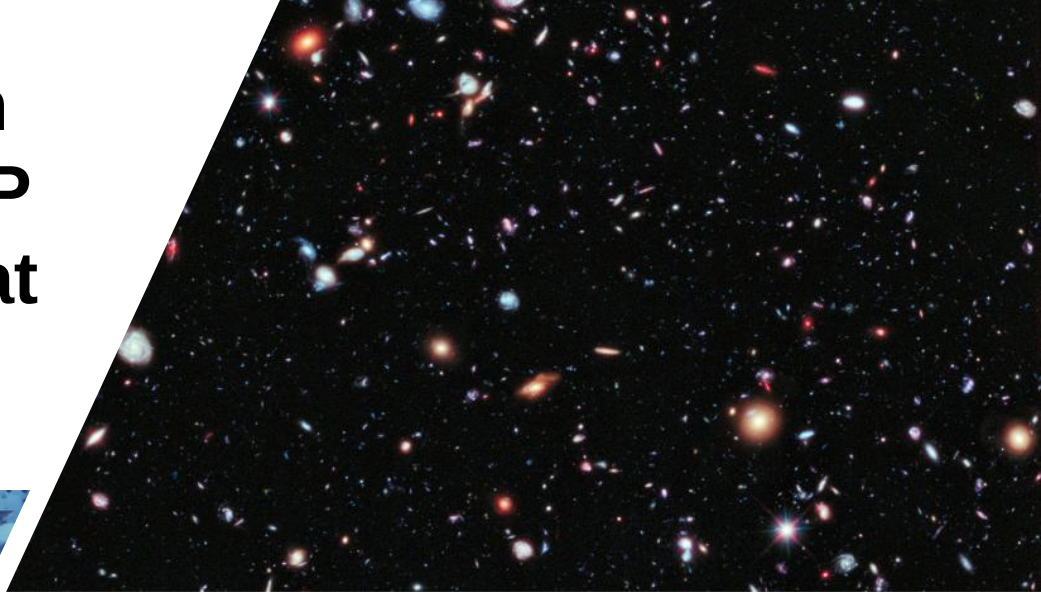
Matter-Antimatter Asymmetry: Why more matter than antimatter in the Universe?





“Study of rare B-meson decays related to the CP observable sin(2β + γ) at the BaBar experiment”





The Energy Frontier

France

The Large Hadron Collider

The SPS Collider

CERN

2006-2012: Postdoctoral Researcher

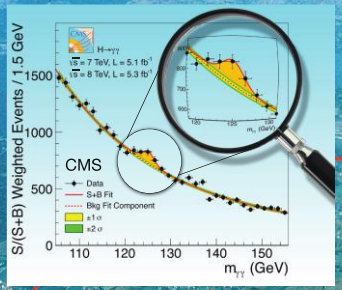
Switzerland

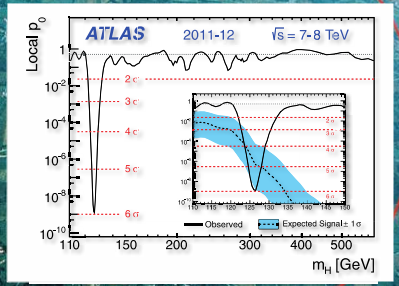
Geneva Airport

LHC Run 1-2

ELSEVIER

First observations of a new particle in the search for the Standard Model Higgs boson at the LHC





www.elsevier.com/locate/physletb

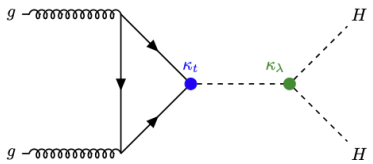
Northeastern University

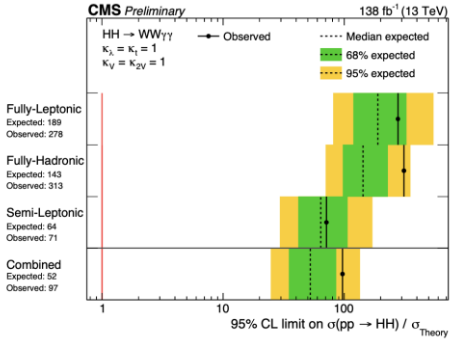
2012-2019: Assistant Professor
2019-present: Associate Professor

Northeastern CMS Orimoto Group

Physics Analysis: Probing NP with H → γγ

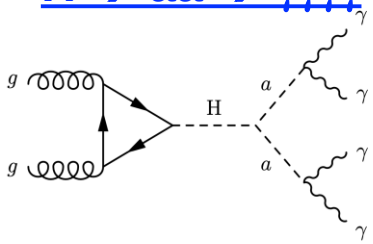
HH → WW γγ

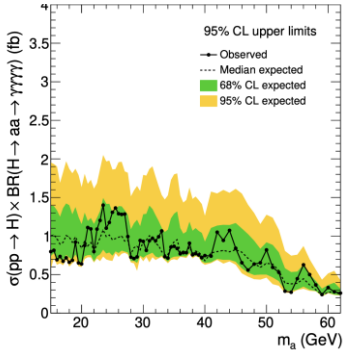




https://cds.cern.ch/record/2840773

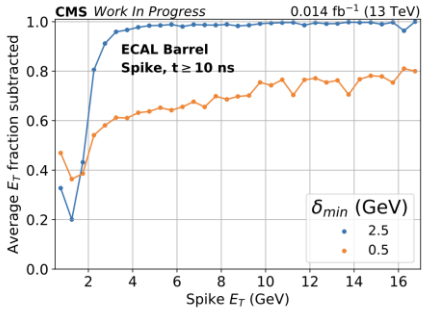
H → aa → γγγγ



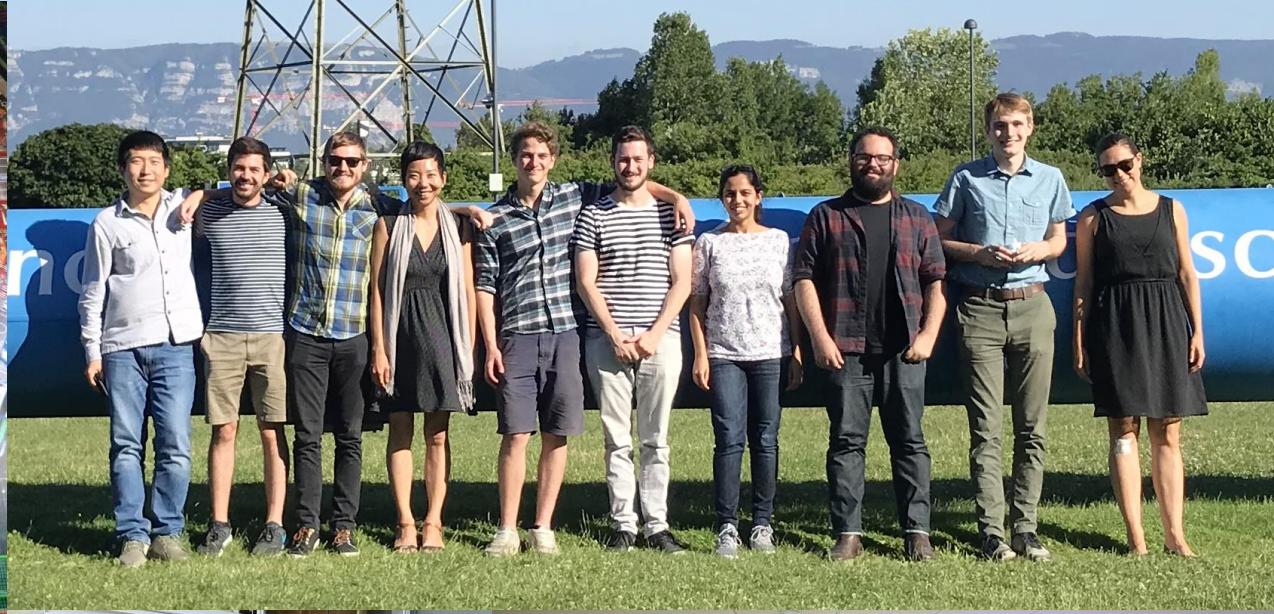


https://link.springer.com/article/10.1007/JHEP07(2023)148

Detector Work: ECAL & MTD



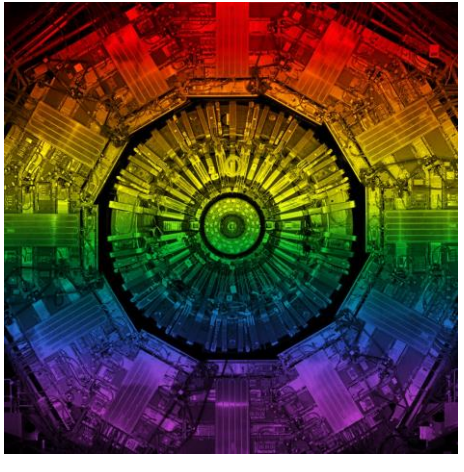
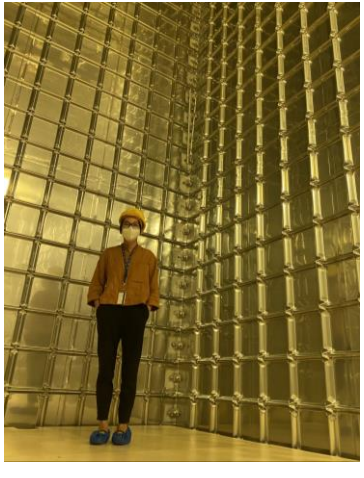
ECAL Trigger

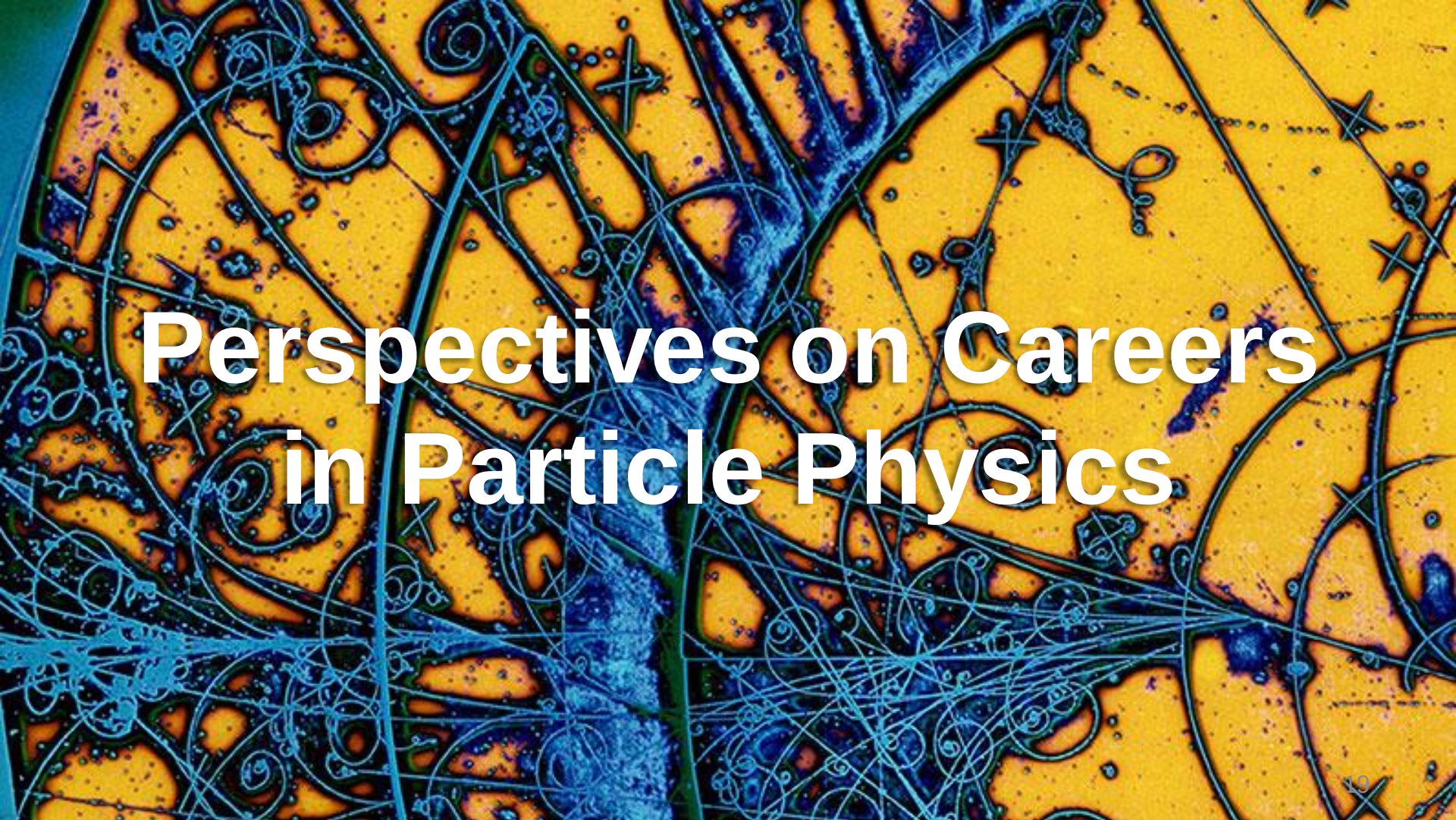




Passion for Particle Physics

- Lots of ups and downs, especially during the pandemic
- Being professor a more complex job that I initially understood
- Being a working parent is really challenging
- Over the years, my career has expanded in its dimensions
- **I feel very fortunate to have my "dream job"!**




Perspectives on Careers
in Particle Physics

Next Steps?

- **Congratulations on getting here!**
- Graduate school is REALLY HARD
- Being a postdoc is REALLY HARD
- Many of us struggle with mental & physical health issues during these challenging periods of our career
- Also many of us experience things like Imposter Syndrome
- For some of us, graduate school or postdoc work is a period for us to decide what to do next…

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Do you still love particle physics?

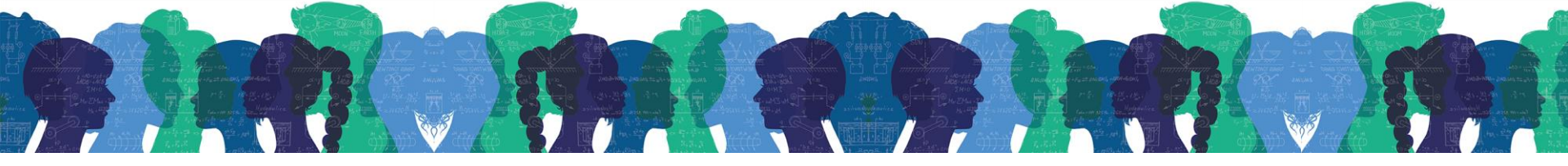
Networking is Important

- **The people you meet now at CERN, schools, conferences, will be your colleagues in the future**

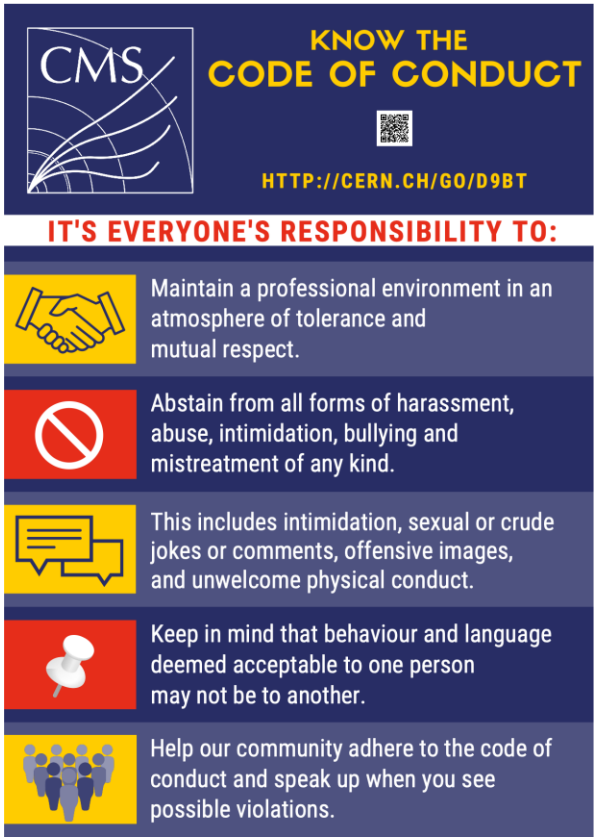
- These are the people who will be giving you jobs, writing letters for promotions, inviting you to conferences, etc
- “All talks are job talks”

Develop a Network of Mentors

- **You will need mentors throughout your career, even as a senior scientist**
- It is valuable to have more than one mentor to get multiple perspectives
- Sometimes your best mentors and greatest champions will be someone who is really dissimilar from you
- Many of us who are minorities in one way or another have no choice but to find mentors that don't "look" like us



Be Respectful & Professional



- **It's the right thing to do**
- **In our field, potential employers are typically looking for people who can work with others**
- Interpersonal skills are important for leadership roles
- It is easier to get people to do things for you by being nice than by being mean

General Advice for Job Seekers

- **Follow your passions:** Even if you don't end up getting your dream job, at least you enjoyed the work; I think most people do their best when they are excited about their work
- **Long-term:** Think about your long-term plans (3, 5, 10+ year plans); where do you want to be at that time?
- **Balance:** Make sure you have a good balance of physics & detector related work, as well as other work (teaching, mentoring, outreach, D&I related work, etc)

Job Applications

- **Highlight Your Accomplishments:** … while being modest and avoiding exaggerations
- **Tailor Your Application:** … to the specific institution
- **Reach out:** Contact the potential employer, inquire about the position, make yourself stand out
- **Get Advice:** … from your mentors and give them sufficient time to provide feedback
- **Letters of Recommendation:** Get letters from people who really know you; be sure that your letters showcase your varied talents; again give sufficient time
- **Time:** A strong application takes time to prepare

Your Research Vision

- **What is your research "vision"?**
- What are the major questions you are trying to answer in your research?
  - For example, my research vision is: *"To explore the energy frontier, utilizing the high precision CMS electromagnetic calorimeter to study the Higgs boson as a probe for new physics. To upgrade the CMS detector to enable new physics capabilities at High-Luminosity LHC."*
- Revisit your "vision" every year or few years

Job Interviews

- **Do Your Homework:** Read up on the institution, department, group, as well as individuals you'll be interviewing with
- **Prepare an "Elevator Pitch":** Be ready with a couple sentences nutshell summary of your research; it can be your "research vision" statement
- **Ask Questions:** People in academia generally love talking about their research
- **Presentation:** Should be polished; be sure to rehearse

Job Offers

- **There are SO many factors that are involved in the hiring process**
- By the time you get to an interview, there are usually at least a few excellent candidates that could get the job
- We're all disappointed at some point in the job application process during our careers…
- Apply for a reasonable number of positions to expand your potential outcomes
- **If you're in the fortunate position to have received an offer, you can NEGOTIATE…**

Good Luck!

- **Don’t forget that you are all very talented – it’s easy to forget when you are at CERN that a PhD in Physics is really special ☺**
- **Here’s an opportunity for you to network ☺!**
  - https://www.linkedin.com/in/toyoko-orimoto-27601a3b/
  - https://twitter.com/toyoko_o/

Resources

- **New England Future Faculty Workshop**
  - More detailed specifics about preparing job applications: https://drive.google.com/drive/folders/1ir5HAbnPfgCtc0n4lDs1Khl5sUr2sRnI?usp=sharing
- **Rising Stars Workshops (US Women in Physics)**
  - https://physicsrisingstars.mit.edu/
- **Women in Technology**
  - https://wit-hub.web.cern.ch/
- **Academic Job Handbook:**
  - https://www.pennpress.org/9780812223408/the-academic-job-search-handbook/


Questions?

Aside: Imposter Syndrome

- **Imposter syndrome: a psychological pattern in which an individual doubts their accomplishments and has a persistent internalized fear of being exposed as a "fraud"**

- In my conversations with colleagues, it seems most of us have experienced this fear at some point in our careers
- I think those earlier in their careers and those who are marginalized are particularly at risk

Cartoon by Lisa Rothstein