

A visualization of particle tracks, likely from a detector, showing a dense cluster of yellow and green lines radiating from a central point, with some blue and red highlights. The background is dark with a greenish glow.

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SPECIAL TOPICS IN EXPERIMENTAL PARTICLE PHYSICS

Lecture 1: Overview

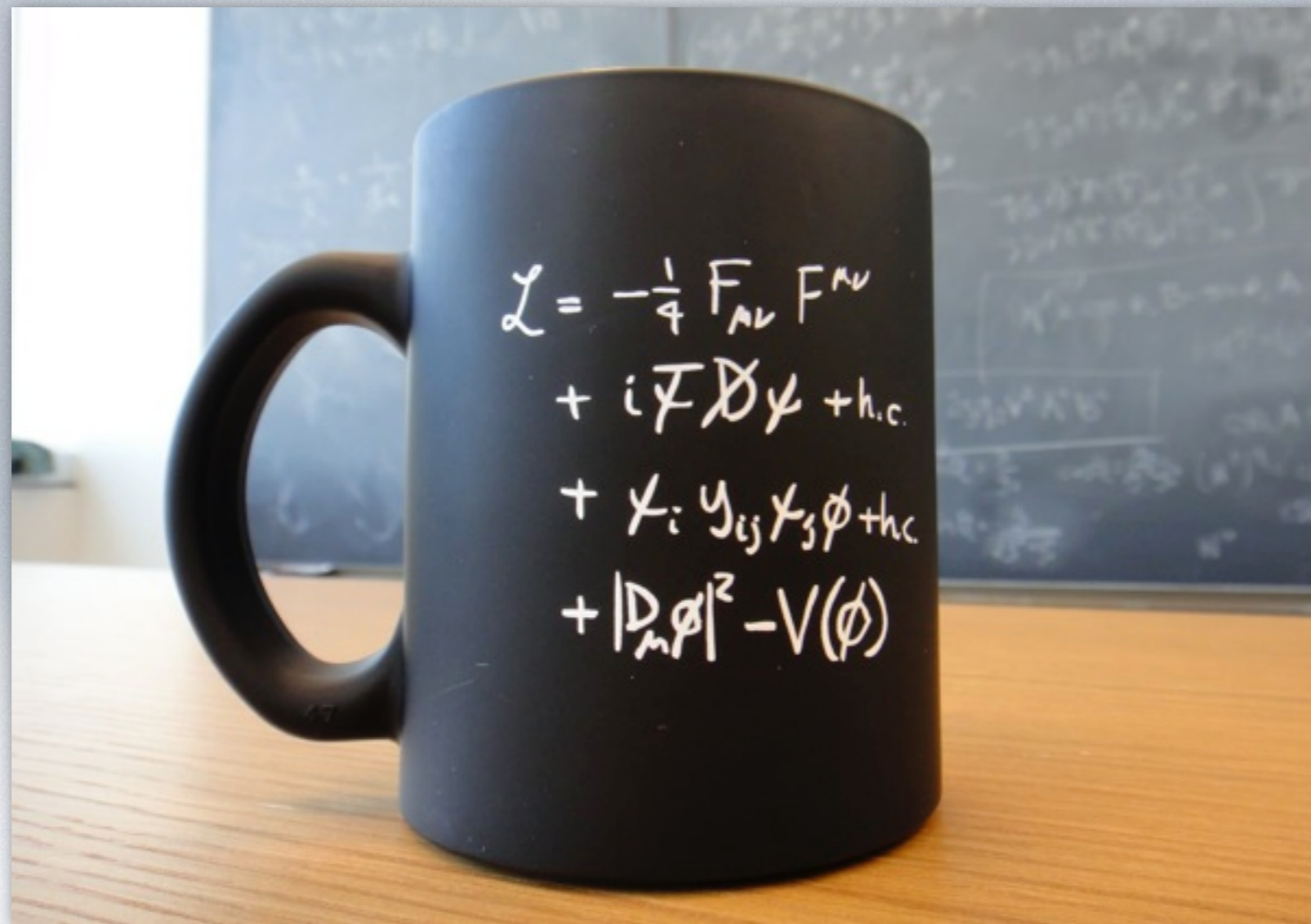
ABOUT THIS COURSE

- ❖ Welcome!
- ❖ As you can see from the cover page, the title of the course is “special topics in experimental particle physics”, but I really want to name it as “**what the hell we are doing at the LHC**”. :-)
- ❖ I want to take the chance to work with you (who selected/joined this course), pick up some topics that can be commonly interesting to us, and go through them together.
- ❖ In short, this course will be very similar to a **journal club**, it will not be a classical teacher-present-student-learn lecture at all.

ABOUT THIS COURSE

- ❖ There is no fixed pre-request for this course (I do not expect all of you have finished the lectures related to particle physics).
- ❖ We will focus on **experimental stuff** — instead of looking at the core Lagrangian, let's start with how we see the particles, what we are actually measuring.
- ❖ Also this is not the official experimental particle physics course, which will make a good overview from the history, detector design, etc. We will only focus on selected topics.

ABOUT THIS COURSE



No Lagrangian; no worry(?)

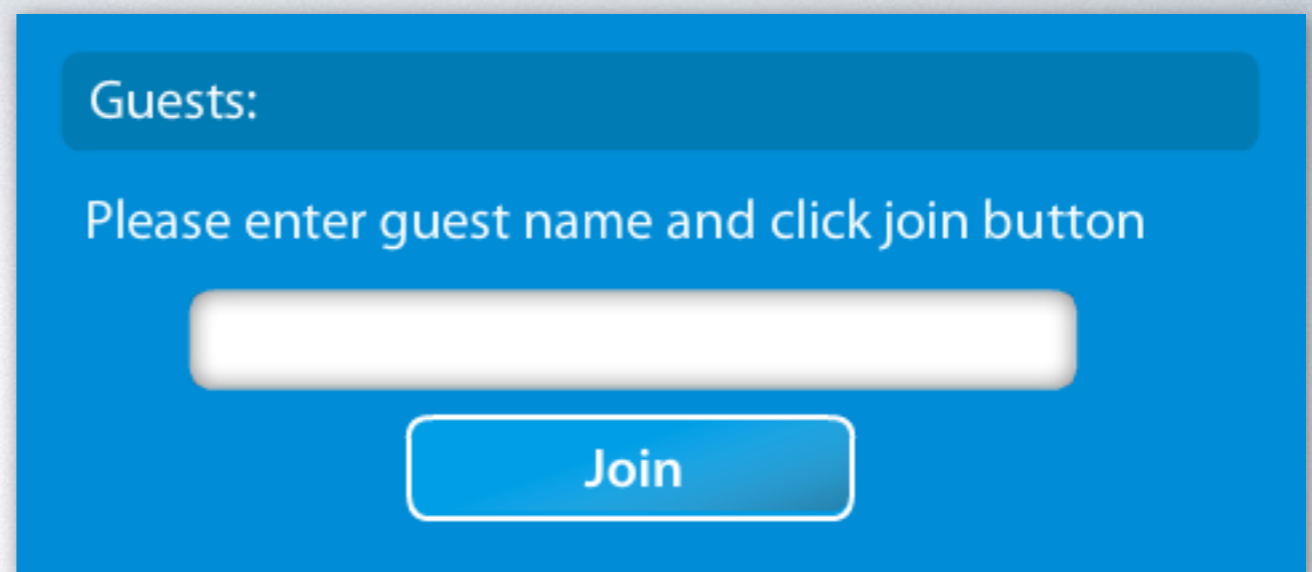
SOME LOGISTICS

- ❖ The first problem: I'm mostly at CERN this semester.
- ❖ The whole course will have to be online: we can probably use **vidyo**, which allows multiple video-enabled clients.
- ❖ Our TA is Charles Dietz, he will prepare the setup at NTU. At least you can join without a technical problem.
- ❖ Is the timing/location okay for everybody? The current allocation is Tuesday 5:30 pm, at room R517. It might be better to use R712 which has the fixed polycom system?

VIDYO HAND-SHAKING

- ❖ We will use vidyo service provided by CERN.
- ❖ Just in case if you want to join the lecture from an independent remote place, you can use the following link (will be used through out the whole semester):
<http://vidyportal.cern.ch/flex.html?roomdirect.html&key=f6R4Bhu8NsEw>
- ❖ This is what you shall see:

*Just type-in your name
and click "Join". ⇒*



The screenshot shows a blue interface for joining a Vidyo session. At the top, there is a dark blue bar with the word "Guests:" in white. Below this, the text "Please enter guest name and click join button" is displayed in white. Underneath the text is a white rectangular input field for the guest name. At the bottom of the interface is a white rounded rectangular button with the word "Join" in blue text.

VIDYO HAND-SHAKING

*This is what you shall see for the first time, or you did not start the “**VidyoDesktop**”. Just install the corresponding software.*

VidyoDesktop 2.x isn't running

If you have previously installed VidyoDesktop 2.x, please start it now.

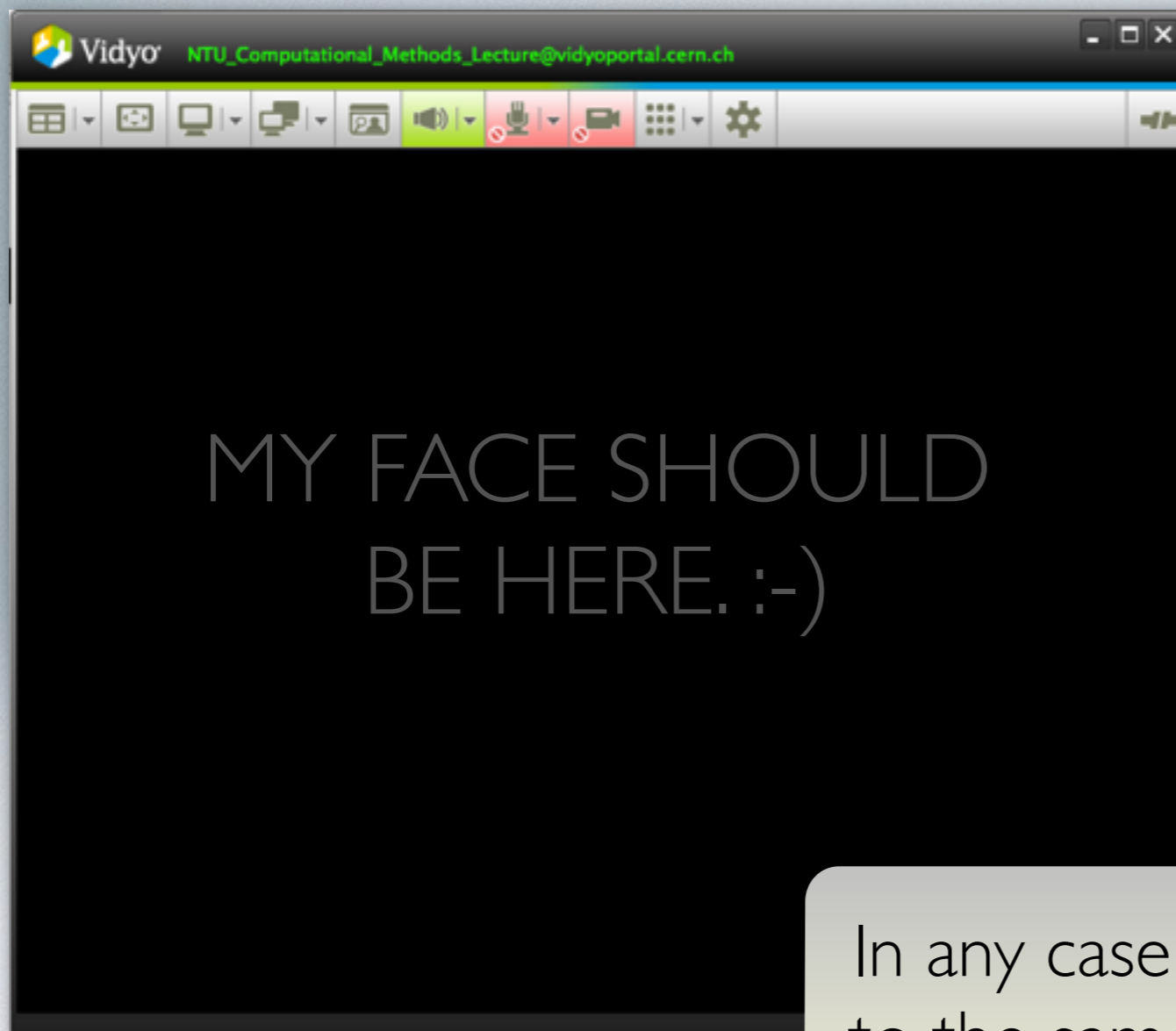
If you need to install VidyoDesktop 2.x please click the following button to download and proceed with the installation.

Install VidyoDesktop

After VidyoDesktop starts allow up to 30 seconds for it to initialize. You should automatically be directed to the main page - If not, please refresh this page and login again

Experiencing difficulties? [contact us](#)

VIDYO HAND-SHAKING



*If everything goes well, this is what you shall see.
If not, try to use a different network or system.*

*ps. NTU wifi may not work due to the dynamic IP issue.
You may have to use VPN.*

In any case you are recommended to come to the same classroom and have the chance to discuss with other people directly.

HOW TO PROCEED?

- ❖ Planned to have this course separated into **three** parts:

An introduction/overview

3~4 weeks

First round:
Your working-in-progress studies

*depends on how many people
joined this course*

Second round:
Any topics of interests

*depends on how many topics
selected in the end*

OVERVIEW/INTRODUCTION

- ❖ I'll make a quick overview through recent LHC physics results, including Standard Model measurements, Higgs, Top, B-physics, SUSY/Exotic searches.
- ❖ The problem of such an overview is obvious. It never goes to very details, but this is for all of us to be synchronized/onboard. Or just warm up.
- ❖ I will run this part with “classical lectures”, but please do not expect I understand everything (which is impossible...).
- ❖ Anything you find that is **potentially interesting** can be good topics for second/third part of this course.

FIRST ROUND

- ❖ The best starting point for everyone is to discuss the research topic **right in your hand**, which can be the physics study you are working on, a recent paper you are reading, or your thesis topic.
- ❖ We will go through each of you, and please prepare a small set of slides to introduce your work/leading the discussion. Everyone else please ask as many questions as you can. :-)
- ❖ Please share the **supporting materials**, such as slides (not necessary made by you actually), paper, or even videos with everyone before your own presentation. We shall read those materials before the course time.

FIRST ROUND

- ❖ For example, if you are working on a dedicated physics analysis topic with LHC data, one can share the following stuff before your own leading presentation:
 - The experimental documents (papers) from CMS/ATLAS/LHCb collaborations.
 - Any good summary presentation you can find.
 - Any theoretical papers you think that are relevant.
 - if you are using any special reconstruction/tool/algorithm (for example, boosted objects, heavy stable particles), you can also share the technical presentation for that.

FIRST ROUND

- ❖ In order to arrange this first round smoothly, **I will collect your basic information first**, such as what is your active topic, who is your boss, etc, together with your name and ID.
- ❖ If you have no idea what to share/what to do, please discuss with me as soon as you can (just send me a mail and we can make an appointment).
- ❖ If you have no active topics (not necessary in particle physics experiment actually!) in hand, please also discuss with me!
- ❖ In any case you will have at least 3~4 weeks preparation time.

SECOND ROUND

- ❖ We will run the second round in a similar way, now we can go to some selected topic beyond your own thesis or active topic.
- ❖ The selection of topics can either from **some leftover questions** when we go through the first two parts of the course, or some topics I personally think that is interesting.
- ❖ We will also select one of you to be the leading reader — you can either again prepare a small set of slides to lead the discussion, or you can use some summary talk that is already available.
- ❖ Surely this may rely on document finding or “google” skills. In general I’ll help to find the materials before the discussion day.

GRADING

- ❖ Unfortunately this is still a course, so we still need to introduce some grading toward your final score. Unavoidable evil?
- ❖ Surely we will have no exams nor classical weekly based assignments.
- ❖ I will do this in a super simple way: base score A^- (if you managed to stay though out most of the semester).
- ❖ Being the discussion leader (collecting the materials for sharing and prepare the leading talk) once you can get A , twice you will get A^+ . So I assume everyone can at least get an A in the end. :-)

FINAL REMARK

- ❖ I would like to stress again this will not be a classical course. I do expect to have your direct/proactive participation.
- ❖ The course hour is for **interactions and discussions**.
- ❖ If you have any issues, please do not hesitate to discuss with me.
- ❖ **Any questions?**