II EARLY CAREER CONFERENCE in TRAPPED IONS

27 June - 1st July, 2022

CERN, Geneva, Switzerland

Program

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Contents

Conference Sessions and Events

Important! Per COST's requirements for participant support, you are required to sign the daily attendance sheets. It will be available daily at the registration desk.

Plenary talks

At ECCTI, every talk is a plenary talk! We will feature 43 contributions divided in 12 sessions over four days. With few exceptions, each talk will be 18 minutes long with additional 4 minutes for questions. All sessions will take place at the CERN Council Chamber (see Maps & Wayfinding) and will be streamed. Both local and remote participants will be able to interact with the speakers via Zoom (you will need to be logged in). In case you have immediate troubles with your conference credentials, a live webcast will also be streamed and open to anyone. It will not, however, permit interactions with the conference.

Keep in mind the ECCTI is intended to connect a broad community with very diverse scientific goals and common technical challenges. When preparing your communication, make sure your presentation is accessible and well motivated.

Poster session

Our poster session will take place in the Pas Perdus exhibition area between 16:30 and 19:00 on Tuesday. A cocktail will be served until 18:00 featuring wines from the wineries around Geneva.

Please ensure that your Poster is A0 in size (1189 x 841 mm / 46.8 x 33.1 inches) and in a portrait format. We will provide a method of fixing your poster to the stand. Poster stands will be available from Monday afternoon to Thursday morning. Please make sure you set your poster up at your designated stand before Tuesday 16:30 and take it out before Thursday 11:00.

A few posters will be presented virtually at Room D, just across the Council Chamber.

Prizes will be given for the best posters based on our community's choice!

For abstracts of all contributions, please check our Indico page or our online book of abstracts.

Skill sessions

ECCTI will feature several events to further leverage your future career in academia or industry.

Lecture: Making the most of your presentation (Mon, 16:45)

Strong presentation skills are a key to success for researchers and other professionals alike, yet many speakers are at a loss to tackle the task. Systematic as they usually are in their work, they go at it intuitively or haphazardly, with much good will but seldom with an effective outcome. This lecture proposes a systematic way to prepare and deliver an oral presentation: it covers structure, slides, and delivery, as well as stage fright.

This lecture will be delivered by Jean-luc Doumont — an engineer from the Louvain School of Engineering and PhD in applied physics from Stanford University who now devotes his time and energy to training researchers, engineers, managers, and other professionals in effective communication, pedagogy, critical thinking, and other themes of professional development.

Workshop: Grant writing (Wed, 16:45)

Pablo Garcia Tello is currently section head of the CERN EU Office developing new EU funded projects and initiatives. He will offer his best tips on how to prepare a successful grant application.

Career Panel (Thu, 15:45)

We have invited early career CERN Alumni currently working in academia, governmental agencies and industry to discuss their inspiring professional journeys. They will tell us about their stories, how they got where they are and answer your most pressing career questions.

The panel will be composed by Silvia Zorzetti (Fermilab SQMS), Federica Mingrone (International Atomic Energy Agency), Mario Michan (Daphne Technology), and Ask Løvschall-Jensen (Hyme Energy, Seaborg Technologies), moderated by Rachel Bray (CERN Alumni Office).

Friday workshops: COMSOL or LabVIEW (Fri, 9:00)

You will learn the basic steps of these powerful computing tools.

The workshop on COMSOL will be offered at the Council Chamber, while the workshop on LabVIEW will take place at the auditorium at Building 222 (close to the Hotel). Please note that the workshops will run in parallel, each taking the full 3 hours that they are scheduled. A 30-min coffee break is scheduled for 10:30.

Although not mandatory, it is recommended to bring your own computer. Practical exercises will be available online through remote desktop.

Conference Dinner

Our conference dinner will take place at the Mövenpick Hotel & Casino, close to Geneva Airport, on Thursday evening. Two buses will pick participants up at 18:45 in front of the main entrance of Building 500, close to the UBS bank agency. Buses returning to CERN will depart at Mövenpick Hotel at 23:00.

In case you miss one of the buses, you can easily get to/from the Mövenpick Hotel by public transport, taking the tram number 18 that stops in front of CERN.

CERN Tours

As you enjoy our 2.5 hours lunch breaks, make sure you hop onto a few tours around CERN facilities:

Synchrocyclotron (SC): CERN's first particle accelerator, now turned into an immersive experience (Mon 12:10, Wed 13:00)

Antiproton Decelerator (AD): a world-unique facility for precision studies of antimatter (Mon 13:00, Tue 13:00)

ISOLDE: our rare and radioactive isotope production facility, also CERN's longest running experimental facility (Mon 13:00, Tue 13:00)

LEIR: the Low Energy Ion Ring is one of the very first stages of beam acceleration into the LHC complex (Wed 13:00, Thu 13:00)

CERN Data Centre: the heart of CERN's scientific computing infrastructure (Thu 12:10)

In most cases, it will be required to walk for about 15 minutes to the tour locations. Therefore, we will leave sharply at the designated time from the meeting point in front of the Council Chamber.

Tours spots are limited and will be distributed on a first come, first served basis. Participants will have to sign up for them in sheets located at the registration desk.

Safety: tours require the use of closed shoes. High-heeled shoes, open-toed shoes, flip-flops and sandals are not permitted. Some areas are not accessible to all visitors (people with reduced mobility, wearers of medical implants or pacemakers, people above or below a certain age, pregnant people, etc.). Please inform with your tour guide.

Detailed Timetable

Monday, June 26

8:30 - 9:24 Welcome & Registration

Council Chamber

8:30 Check-in and Registration at Pas Perdus

9:00 Welcome to ECCTI 2022

9:24 - 10:30 Antimatter I

Council Chamber, chair: Elise Wursten (RIKEN)

9:24 The PUMA Experiment: Investigating Short-lived Nuclei with Antiprotons
Alexander SCHMIDT (TU Darmstadt)

9:46 Ultra-high precision laser spectroscopy of anti-hydrogen
Janko NAUTA (Swansea University)

10:08 Sympathetic cooling of a single proton in a Penning trap by laser-cooled beryllium ions
Christian WILL (MPIK)

10:30 - 11:00 Coffee Break

Pas Perdus

11:00 - 12:10 Quantum Information & Computing I

Council Chamber, chair: TBD

11:00 Qubit addressing in a standing wave light field from integrated photonics
Carmelo MORDINI (ETH Zürich)

11:23 Towards standing-wave quadrupole Mølmer-Sørensen gates
Oana BAZAVAN (University of Oxford)

11:45 Standing-Wave Mølmer–Sørensen Gate in the Adiabatic and Non-Adiabatic Regime
Sebastian SANER (University of Oxford)

12:10 - 14:30 Lunch Break & Tours

Meeting point for tours: in front of Council Chamber, arrive 5 minutes before start time

12:10 - 13:00 Tour: Synchrocyclotron

13:00 - 14:30 Tour: Antiproton Decelerator

13:00 - 14:30 Tour: ISOLDE

14:30 - 16:15 Nuclear Physics I

Council Chamber, session chair: Simon Lechner (McGill Univserity)

14:30 High-Resolution Mass Measurements at the FRS Ion Catcher in the vicinity of ^{100}Sn
Ali MOLLAEBRAHIMI (University of Giessen & TRIUMF)

14:53 High precision mass measurement of ^{24}Si and a final determination of the rp-process at the A=22 waiting point
Daniel PUENTES (Michigan State University)

15:15 News From the ISOLTRAP Mass Spectrometer
Lukas NIES (CERN & University of Greifswald)

15:35 Ion Trapping Developments at Edinburgh University, Towards Precise Mass Measurements of Light Exotic Nuclei at TITAN
Callum BROWN (University of Edinburgh)

15:55 Implementation of the double Penning trap mass spectrometer MLLTRAP at ALTO
Elodie MORIN (IJCLab)

16:15 - 16:45 Coffee Break

Pas Perdus

16:45 - 18:45 Skill Session I

Council Chamber

16:45 Lecture: Making the most of your presentation
Jean-luc Doumont (Principiae)

Tuesday, June 27

9:00 - 10:30 Quantum Technologies I

Council Chamber, chair: Silke Auchter (Infineon Technologies Austria AG)

9:00 Multi-tone RF generation for intermediate-scale trapped-ion control
Martin STADLER (ETH Zürich)

9:23 A laser-cooled $^{40}Ca^{+}$ ion and a $^{40}Ca^{+}$ – $^{40}Ca^{+}$ ion crystal for systematic investigations of motional quantum metrology
Francisco DOMÍNGUEZ (Universidad de Granada)

9:45 Trapped ions in optical tweezers
Matteo MAZZANTI (University of Amsterdam)

10:08 Selective properties of a Paul trap with the asymmetrical power supply
Olga KOKORINA (ITMO University)

10:30 - 11:00 Coffee Break

Pas Perdus

11:00 - 12:10 Quantum Simulation I

Council Chamber, chair: Zachary Smith (United States Air Force Research Laboratory)

11:00 Trapping and ground-state cooling of planar ion crystals in a novel linear Paul trap
Dominik KIESENHOFER (University of Innsbruck)

11:23 Digital quantum simulation of a topological spin chain
Claire EDMUNDS (University of Innsbruck)

11:45 Fock state detection and simulation of sub- and superradiant emission with a single trapped ion
Harry PARKE (Stockholm University)

12:10 - 14:30 Lunch Break & Tours

Meeting point for tours: in front of Council Chamber, arrive 5 minutes before start time

13:00 - 14:30 Tour: Antiproton Decelerator

13:00 - 14:30 Tour: ISOLDE

14:30 - 15:55 Antimatter II

Council Chamber, chair: April Cridland (Swansea University)

14:30 muCool: A novel low-energy muon beam for precision experiments
Giuseppe LOSPALLUTO (ETH Zürich)

14:53 BASE: Towards a 10-fold improved measurement of the Antiproton Magnetic Moment
Markus FLECK (University of Tokyo)

15:15 Transportable Cryostat and Permanent Magnet Trap for Transporting Antiprotons
Daniel POPPER (Johannes Gutenberg University Mainz)

15:38 Construction and tests of image-current detection systems for the transportable antiproton trap BASE-STEP
Fatma ABBASS (Johannes Gutenberg University Mainz)

15:55 A word from our Sponsors: Atlas Copco

16:10 - 16:30 Coffee Break

16:30 - 19:00 Poster Session

Pas Perdus

16:30 - 19:00 Posters Session at Pas Perdus
16:30 - 19:00 Virtual posters presentation at Room D
16:30 - 18:00 Cocktail service at Pas Perdus

Wednesday, June 28

9:00 - 10:30 Precision Spectroscopy I

Council Chamber, chair: Laura Blackburn (University of Sussex)

9:00 Towards quantum control and spectroscopy of a single hydrogen molecular ion
David HOLZAPFEL (ETH Zürich)

9:23 Tests of QED with singly-ionized helium
Andres MARTINEZ DE VELASCO (Vrije Universiteit Amsterdam)

9:45 Penning-trap mass spectrometry using an unbalanced crystal and optical detection
Joaquín BERROCAL SANCHEZ (Universidad de Granada)

10:08 A Measurement of the $^{88}\mathrm{Sr}^+$ $S_{1/2} \rightarrow D_{5/2}$ / $^{171}\mathrm{Yb}^+$ $S_{1/2} \rightarrow F_{7/2}$ frequency ratio with in-situ BBR shift evaluation
Martin STEINEL (Physikalisch-Technische Bundesanstalt)

10:30 - 11:00 Coffee Break

Pas Perdus

11:00 - 12:10 Quantum Information & Computing II

Council Chamber, chair: Carmelo Mordini (ETH Zürich)

11:00 Operation of a microfabricated 2D trap array
Marco VALENTINI (University of Innsbruck)

11:23 Microfabricated 3D Ion Traps and Integrated Optics
Jakob WAHL (University of Innsbruck & Infineon Technologies Austria AG)

11:45 Signal Generation for Trapped Ion Quantum Gates
Norman KRACKOW (TU Berlin & QUARTIQ)

12:10 - 14:30 Lunch Break & Tours

Meeting point for tours: in front of Council Chamber, arrive 5 minutes before start time

13:00 - 14:10 Tour: Synchrocyclotron

13:00 - 14:10 Tour: LEIR

14:30 - 16:00 Antimatter III

Council Chamber, chair: Janko Nauta (Swansea University)

14:30 Fundamental tests of antimatter gravitation with antihydrogen accelerators
Jaspal SINGH (University of Manchester)

14:53 Positron plasma creation and manipulation in the ASACUSA Cusp experiment
Andreas LANZ (Austrian Academy of Sciences)

15:15 An Ion Trap Source of Ultracold Atomic Hydrogen via Photodissociation of the BaH^+ Molecular Ion
Steven Armstrong JONES (Swansea University)

15:38 ASACUSA's low energy proton source for matter studies
Alina WEISER (Austrian Academy of Sciences)

16:00 - 16:45 Coffee Break

Pas Perdus

16:45 - 18:15 Skill Session II

Council Chamber

16:45 Workshop: Grant Writing
Pablo Garcia Tello (CERN)

Thursday, June 29

9:00 - 10:30 Nuclear Physics II

Council Chamber, chair: Simon Lechner (McGill University)

9:00 Developments for an increased detection sensitivity of the neutrinoless double-beta decay ($0\nu\beta\beta$) mode in the NEXT experiment
Samuel AYET SAN ANDRES (JLU Giessen)

9:23 The commissioning of a Paul trap for laser spectroscopy of exotic radionuclides in an MR-ToF device
Carina KANITZ (German Aerospace Center)

9:45 Doppler- and sympathetic cooling for the investigation of short-lived radionuclides
Franziska MAIER (CERN-ISOLDE)

10:08 Trapping Swift Divergent Ions with Stacked Rings
Xiangcheng CHEN (University of Groningen)

10:30 - 11:00 Coffee Break

Pas Perdus

11:00 - 12:10 Quantum Information & Computing III

Council Chamber, chair: Amy Hughes (Oxford Ionics)

11:00 Collaborative design of a trapped-ion quantum computer with fully interconnected qubits
Celeste TORKZABAN (Leibniz Universität Hannover)

11:23 Device-Independent Quantum Key Distribution Between Two Ion Trap Nodes
David NADLINGER (University of Oxford)

11:45 A two-node trapped-ion quantum network with photonics interconnects
Gabriel ARANEDA (University of Oxford)

12:10 - 14:10 Lunch Break & Tours

Meeting point for tours: in front of Council Chamber, arrive 5 minutes before start time

12:10 - 13:20 Tour: CERN Data Centre

13:00 - 14:10 Tour: LEIR

14:10 - 14:55 Quantum Information & Computing IV

Council Chamber, chair: Gabriel Araneda (University of Oxford)

14:10 ABaQuS: A trapped-ion quantum computing system using $^{133}Ba^{+}$ qubits
Ana SOTIROVA (University of Oxford)

14:33 Trapped Barium Ions at the United States Air Force Research Laboratory
Zachary SMITH (United States Air Force Research Laboratory)

14:55 A word from our Sponsors: Quantum FutureX

15:15 - 15:45 Coffee Break

Pas Perdus

15:45 - 18:15 Skill Session III

Council Chamber

15:45 Career Panel with CERN Alumni

18:15 - 18:35 Conference Photo

Outside Restaurant 1, in front of LHC dipole, weather permitting. Otherwise, Council Chamber

18:45 - 23:00 Conference Dinner

Mövenpick Hotel & Casino, Geneva

18:45 Bus departure from Bldg. 500

19:00 Dinner at Mövenpick Hotel

23:00 Return bus to CERN

Friday, July 1

9:00 - 12:00 Skill Session IV

9:00 - 12:00 COMSOL workshop — Council Chamber
9:00 - 12:00 LabVIEW workshop — Room 222/R-001, close to Hotel

10:30 - 11:00 Coffee Break

Pas Perdus / Bldg. 222

List of Posters

Antimatter:

1. Improved precision on the measurements of low energy antimatter in the ALPHA experiment
   Edward Thorpe-Woods (Swansea University)

2. Sympathetic cooling of $^{9}Be^{+}$ by laser-cooled $^{88}Sr^{+}$ in an ion trap: an experimental simulation of the trapping and cooling of antimatter ions (GBAR experiment).
   Derwell Drapier (Laboratoire Kastler-Brossel - CNRS)

3. Towards observing anti-hydrogen fluorescence: Investigation of SiPMs in cryogenic environments
   Joos Schoonwater (Eindhoven Technical University)

4. The Effects of Patch Potentials in Penning-Malmberg Traps
   Andrew Christensen (University of California Berkeley)

5. Sympathetic cooling of positrons with laser-cooled beryllium ions
   Joanna Peszka (Swansea University)

6. Non-Destructive Diagnostics for the PUMA Antiproton Trap
   Jonas Fischer (TU Darmstadt)

7. Improving frequency resolution in BASE
   Julia Jäger (CERN / MPIK)

8. Application of electron cyclotron resonance (ECR) magnetometry for experiments with antihydrogen
   Adam Powell (University of Calgary)

Nuclear Physics:

9. Development of a novel ion trap for laser spectroscopy
   Giuseppe Lospalluto (ETH Zurich) & Jaspal Singh (University of Manchester)

10. Bound Electron g Factor Measurements of Highly Charged Tin
    Jonathan Morgner (MPIK)

11. Characterization of a Multi-Reflection Time-of-Flight Mass Separator (MR-ToF MS) for the Offline Ion Source of PUMA
    Moritz Schlaich (TU Darmstadt)

12. Alkali-earth ions Confined for Optical and Radiofrequency spectroscopy for Nuclear moments (ACORN)
    Anaïs Dorne (KU Leuven)

Precision Spectroscopy:

13. A compact penning trapped ion system for precision measurement
Yao Chen (Xi'an Jiaotong University)

14. Towards High Resolution Spectroscopy of Nitrogen Ions
Amber Shepherd (University of Sussex)

15. Towards the Threshold Photodetachment Spectroscopic studies of C_2^- and C_2H^-
Sruthi Purushu Melath (University of Innsbruck)

16. Gas-phase spectroscopic studies of $[dAMP\text{-}H]^-$ in cryogenic 16-pole wire trap
Salvi Mohandas (IISER Tirupati)

17. Correlation spectroscopy with multi-qubit-enhanced phase estimation
Helene Hainzer (University of Innsbruck)

18. Precision measurement of electron g-factor in highly charged ions at ARTEMIS
Kanika Kanika (GSI)

19. Feshbach resonances in a hybrid atom-ion system
Joachim Welz (Albert-Ludwigs-Universität Freiburg)

Quantum Information & Computing:

20. Coherent control of ion motion via Rydberg excitation
Marion Mallweger (Stockholm University)

21. Photon statistics from a large number of independent single-photon emitters.
Artem Kovalenko (Palacký University)

22. Dielectric Properties of Plasma Oxides for Microfabricated Ion Traps
Alexander Zesar (Infineon Technologies Austria AG)

23. Feasible enhancement of collection efficiency of light from trapped ions
Thuy Dung Tran (Palacký University)

24. A multi-qubit gate zone for use in a large scale ion shuttling architecture
Alex Owens (University of Sussex)

25. Simulating Potentials and Shuttling Protocols on an X-Junction Surface Trap
Sahra Ahmed Kulmiya (University of Sussex)

26. Microwave-driven quantum logic in $^{43}Ca^+$ at 288 Gauss
Mario Gely (University of Oxford)

27. High-Fidelity Entanglement Gates on Microfabricated Ion-Traps
Petros Zantis (University of Sussex)

28. Technical challenges of quantum computing with radioactive $^{133}Ba^+$ ions
Jamie Leppard (University of Oxford)

29. Towards measurement-based blind quantum computing with trapped ions
Peter Drmota (University of Oxford)

30. Quantum thermodynamics: Heat leaks and fluctuation dissipation
Oleksiy Onishchenko (Universität Mainz)

31. Multipartite entanglement of trapped ions by graph-based optimized global Raman beams
Arjun Rao (University Of Sydney)

32. Single Ion Addressing for Reliable Isolation of $^{171}Yb^{+}$ Hyperfine Qubit States
Maverick Millican (University of Sydney)

33. Photonic integration for trapped-ion quantum information science
Felix Knollmann (MIT)

34. Improving robustness of laser-free entangling gates for a trapped-ion architecture
Madalina Mironiuc (University College London)

Quantum Technologies:

35. Quantum non-Gaussianity of multiphonon states of a single atom
Lukas Podhora (Palacký University)

36. Automated optical inspection and electrical measurement of industrially fabricated surface ion traps
Fabian Anmasser (Infineon Technologies Austria AG)

37. Higher-order effects of electric quadrupole fields on a single Rydberg ion
Shalina Salim (Stockholm University)

38. Industrially microfabricated ion traps with low loss materials
Matthias Dietl (Universität Innsbruck & Infineon Technologies Austria AG)

39. A matter link for remote ion-trap modules
Falk C M Bonus (University College London)

40. TSV-integrated Surface Electrode Ion Trap for Scalable Quantum Information Processing
Théo Henner (Université de Paris)

41. Demonstrating a logical qubit on a surface ion trap
Daisy Smith (University of Sussex)

42. Towards a fault-tolerant universal set of microwave driven quantum gates with trapped ions
Hardik Mendpara (Leibniz-Universität Hannover)

Maps & Wayfinding

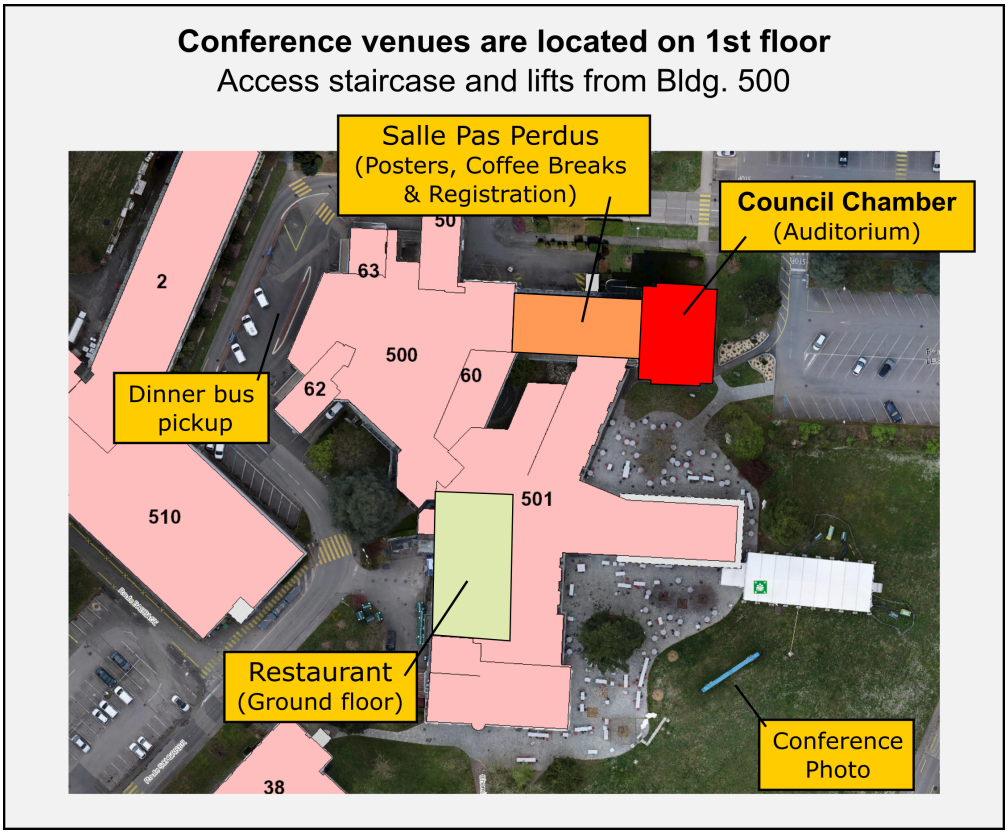
For the best experience, visit `https://maps.cern.ch` or download the CERN Maps App: `https://sce-dep.web.cern.ch/mobile-applications`

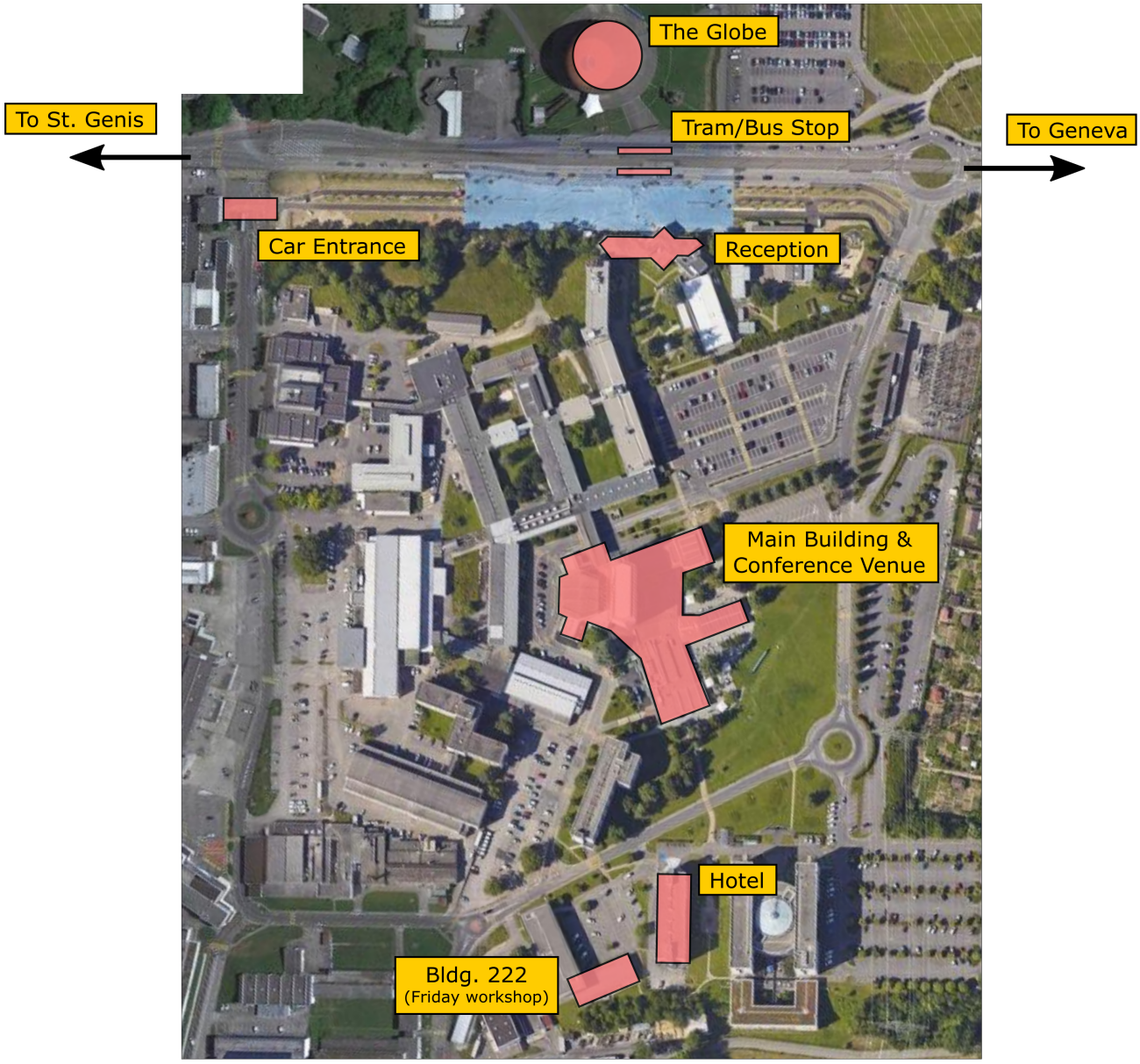
The conference will take place in the **Council Chamber** (503/1-001), located in the first floor of the Main Building. You can easily access through the staircase on the ground floor of Building 500. Coffee Breaks and the Poster Session will take place in the Pas Perdus (61/1-201), located just in front of the Council Chamber.

The area is conveniently located close to CERN's Restaurant 1 (same building, ground floor), banks, convenience shops, vending machines, a post office and just a few minutes walk from the CERN Hostel.

During your stay, you can also visit the permanent exhibitions at The Globe (across the street) and at the Universe of Particles, accessible through the Reception at Building 33. CERN's Gift Shop is just at the entrance at Building 33.

In the maps below, you will find the main locations relevant to the conference.




The Globe
To St. Genis
Tram/Bus Stop
To Geneva
Car Entrance
Reception
Main Building &
Conference Venue
Hotel
Bldg. 222
(Friday workshop)