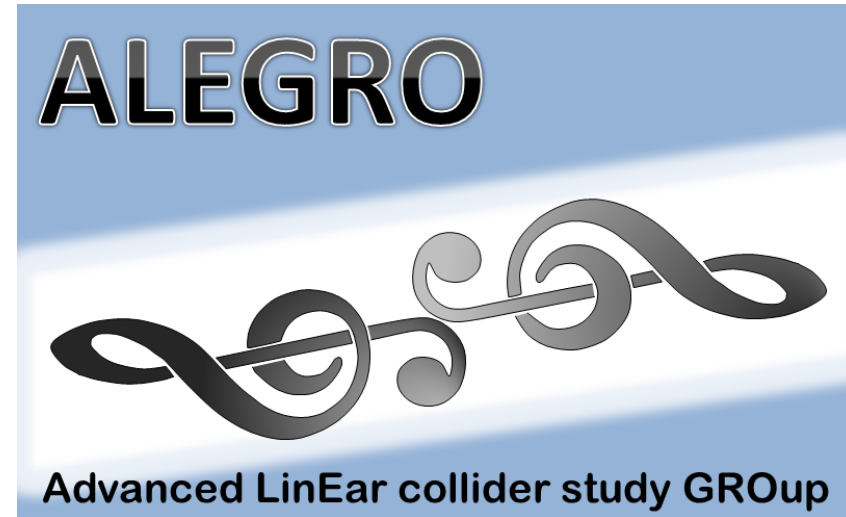


Warm welcome to the

2019



Workshop

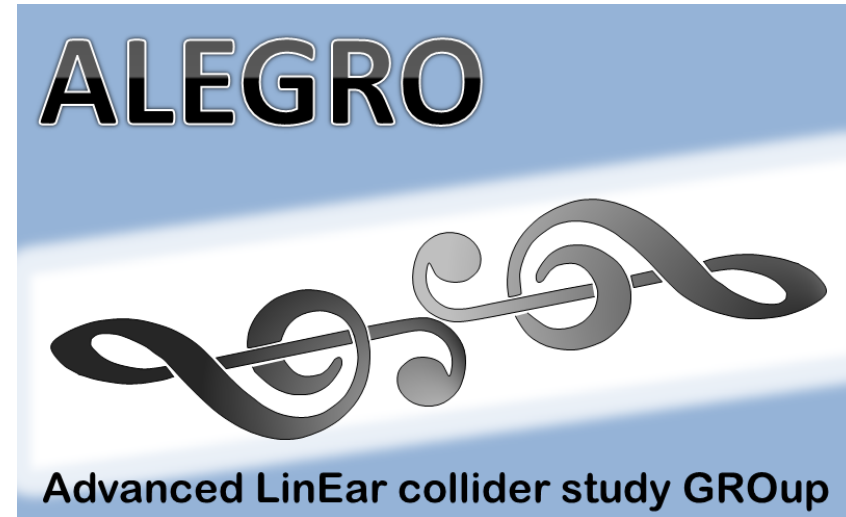
Welcome remark by:

Dr. Eckhard Elsen

Director of Research and Computing, CERN

Warm welcome to the

2019



Workshop

Patric Muggli, Max Planck Institute for Physics

Organizing committee: Brigitte Cros (CNRS)
Edda Gschwendtner (CERN)
Patric Muggli (Max Planck Institute)
Daniel Schulte (CERN)

Support: Angélique Foussat (CERN)

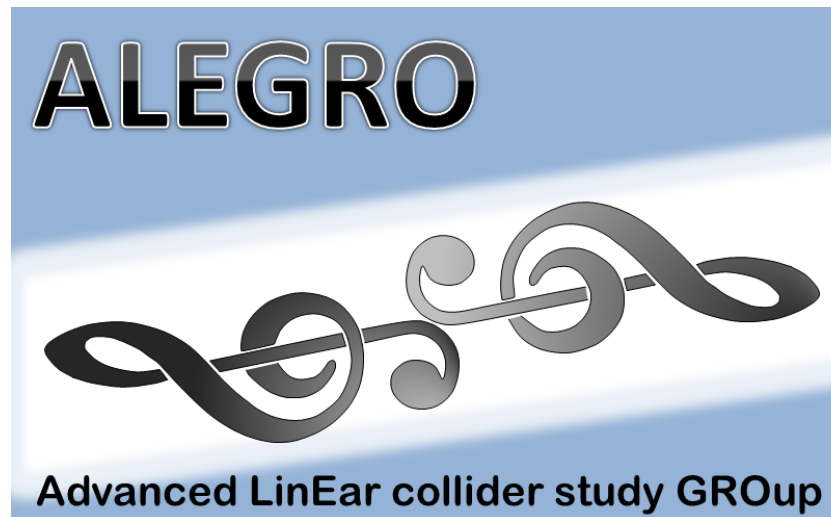
HOW DID WE GET HERE?



<https://indico.cern.ch/event/569406/>



ANAR2017: Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop 2017

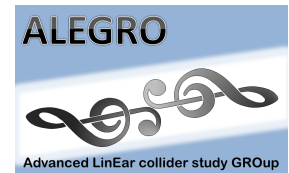


... is one of the major outcome of the ANAR 2017 workshop!

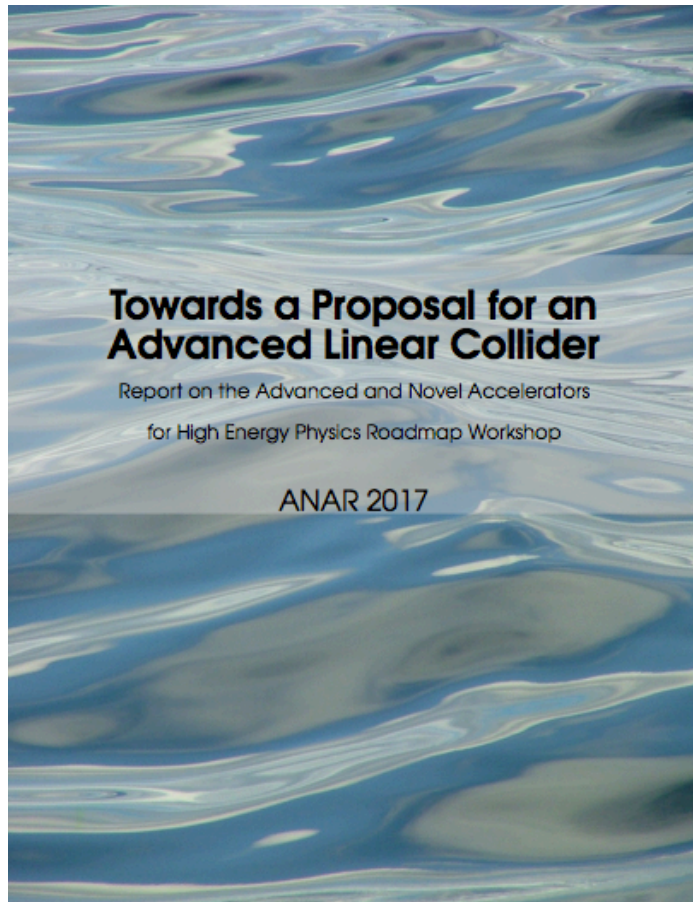
(Advanced LinEar collider study GROup) is a study group towards Advanced Linear Colliders.

ALEGRO's general charge is to coordinate the preparation of a proposal for an advanced linear collider in the multi-TeV energy range.

HOW DID WE GET HERE?



ANAR2017: Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop 2017

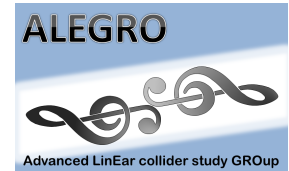


Document broadly distributed to laboratories management and funding or deciding agencies...
to demonstrate the existence of a community and of a plan for ANA* applications to high-energy physics

*Advanced and Novel Accelerators

... is another major outcome of the ANAR 2017 workshop!

HOW DID WE GET HERE?



ANAR2017: Advanced and Novel Accelerators
for High Energy Physics Roadmap Workshop
2017



Decided to prepare a document for the 2020
European Strategy for Particle Physics

First concrete action
European Strategy, but input from the world-wide
community (ANA, ALEGRO)

Created the ALEGRO Workshop series ...

Chose: Advanced Linear Collider, ALIC

... other major outcome of the ANAR 2017 workshop!

HOW DID WE GET HERE?



ANAR2017: Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop 2017

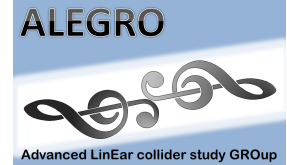


3rd European Advanced Accelerator Concepts Workshop
<http://agenda.infn.it/event/EAAC2017>
Supported by EU/ARIES via EuroNNac3
24-30 September 2017, La Biodola - Isola d'Elba - Italy

- Laser technology for advanced accelerators
- Dielectric structures and other novel technologies
- Advanced and novel accelerators for high energy physics
- High gradient and multibunch acceleration in metallic structures (C-X-band and beyond) with innovative power generation schemes
- Plasma accelerators driven by: modern lasers, electron beams, proton beams
- Computations for accelerator physics advanced beam diagnostics for beams and plasma
- Novel schemes using advanced technologies (table-top FEL, medical imaging ...)

The logo for EAAC 2017 features the letters "EAAC" in a large, stylized font with a blue and yellow color scheme, and the year "2017" to its right. The background of the slide shows a scenic view of a coastline with hills and buildings.

HOW DID WE GET HERE?



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Workshop Organizing Committee

Ralph Assmann (DESY, Germany), **CO-CHAIR**
 Ulrich Dorda (DESY, Germany), **Proceedings Editor**
 Massimo Ferrario (INFN - LNF, Italy), **CO-CHAIR**
 Bernhard Holzer (CERN, Switzerland)
 Alban Mosnier (CEA, France)
 Jens Osterhoff (DESY, Germany)
 Arnd Specka (Ecole Polytechnique, France)
 Roman Walczak (JAI, UK)

Programme Committee

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 Deepa Angal-Kalinin (STFC, UK)
 Arnaud Beck (IN2P3, France)
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 Alessandro Fiacco (I.O.A. France)
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 Bernhard Schmidt (DESY, Germany)
 Carl Schroeder (LBNL, USA)
 Chuanxiang Tang (Tsinghua Univ, China)
 Louise Willingdale (Lancaster University, USA)
 with the Organizing Committee

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 Chan Josh (UCLA, USA)
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 Georg Korn (Fyzikální ústav AV ČR, Czech Republic)
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 Guoxing Xia (University of Manchester, UK)
 Vitaly Yakovlev (SLAC, USA)
 Frank Zimmermann (CERN, Switzerland)

WGB - Advanced and novel accelerators for High Energy Physics

Topics addressed:

- Examine key challenges
- Discuss suitable concepts and identify topics for future R&D or innovation including electron and positron sources, optics between stages, acceleration of positrons, luminosity, final focus, damping ring and efficiency

Co-Leader: Brigitte Cros
Co-Leader: Patric Muggli
Co-Leader: Carl Schroeder
Co-Leader: Chuanxiang Tang

Nuclear Inst. and Methods in Physics Research, A 909 (2018) 460–462



Contents lists available at ScienceDirect

Nuclear Inst. and Methods in Physics Research, A

journal homepage: www.elsevier.com/locate/nima



Summary of Working Group 8: Advanced and Novel Accelerators for High Energy Physics

B. Cros^{a,*}, P. Muggli^{b,c}, C.B. Schroeder^d, C. Tang^e

^a *LPGP CNRS, Université Paris-Sud, Université Paris Saclay, Orsay, France*

^b *Max Planck Institute for Physics, München, Germany*

^c *CERN, Geneva, Switzerland*

^d *Lawrence Berkeley National Laboratory, Berkeley, CA, USA*

^e *Tsinghua University, Beijing, China*



HOW DID WE GET HERE?



ANAR2017: Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop 2017



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The logo for EAAC 2017 features the letters "EAAC" in a large, stylized font with a blue and yellow color scheme, and "2017" in a smaller font to the right. The background of the slide shows a scenic view of a coastline with hills and buildings.The logo of the University of Oxford, featuring a circular emblem with a book and a cross.

UNIVERSITY OF OXFORD

The logo for the John Adams Institute for Accelerator Science (JAI), featuring the letters "JAI" in a stylized font.

JAI
John Adams Institute
for Accelerator Science

The logo for Somerville College, featuring a shield with three red crosses and a white cross.

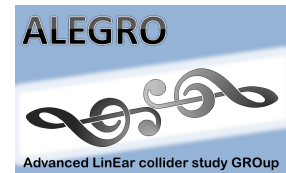
Somerville College

ALEGRO 2018 workshop at Oxford

26 March - 29 March 2018, Oxford, UK

A photograph of a large, historic stone building with multiple chimneys and windows, identified as Somerville College in Oxford.

HOW DID WE GET HERE?



ANAR2017: Advanced and Novel Accelerators for High Energy Physics Roadmap Workshop 2017



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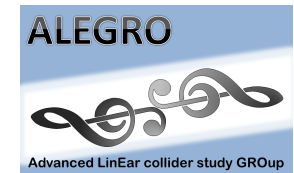
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ALEGRO 2018 workshop at Oxford
26 March - 29 March 2018, Oxford, UK



Breckenridge COLORADO
AUG 12-17, 2018
BEAVER RUN RESORT AND CONFERENCE CENTER

ESPP INPUT



ALEGRO input for the 2020 update of the European Strategy for Particle Physics: comprehensive overview

Contacts: B. Cros¹, P. Muggli²
on behalf of ALEGRO collaboration,

member list at <http://www.lpgp.u-psud.fr/icfaana/alegro/alegro-members>

¹ LPGP, CNRS, Université Paris Sud, Orsay France, email: brigitte.cros@u-psud.fr

²Max Planck Institute for Physics, Munich, Germany, email: muggli@mpp.mpg.de

arXiv:1901.08436

Advanced and Novel Accelerators (ANAs) can provide acceleration gradients orders of magnitude greater than conventional accelerator technologies, and hence they have the potential to provide a new generation of more compact, high-energy machines. Four technologies are of particular interest, all of which rely on the generation of a wakefield which contains intense electric fields suitable for particle acceleration. In the laser wakefield accelerator (LWFA) and plasma wakefield accelerator (PWFA) the wakefields are driven in a plasma by intense laser or particle beams, respectively; in the structure wakefield accelerator (SWFA), the wake is excited by a particle bunch propagating through a structured tube; and in the dielectric laser accelerator (DLA), a laser pulse directly drives an accelerating mode in a dielectric structure.

In view of the great promise of ANAs, and the substantial effort worldwide to develop them, the Advanced LinEar collider study GROUp, ALEGRO, was formed at the initiative of the ICFA ANA panel. ALEGRO aims to foster studies on accelerators based on ANAs for applications to high-energy physics, with the ambition of proposing a machine that would address the future goals of particle physics. This document summarizes the current view of the international community on this topic. It proposes a list of priorities that the community would like to invest effort in over the next five to ten years.

We propose as a long-term goal the design of an $e^+/e^-/\gamma$ collider with up to 30 TeV in the center of mass - the Advanced Linear International Collider (ALIC). On the path to this collider, a number of stepping stones have to be established. These will lead to spin-offs at lower energy that will benefit ultrafast X-ray science, medicine, and industrial applications. **The major goal for our community over the next five to ten years is the construction of dedicated ANA facilities that can reliably deliver high-quality, multi-GeV electron beams from a small number of stages.** The successful demonstration of robust stages of this type would provide a platform for ANAs with large number of stages generating high-quality beams in the TeV range.

The document also discusses other challenges that must be met for the complete ALIC concept. These include the design of appropriate particle sources, the development of high-power lasers needed for LWFAs and DLAs, the achievement of required tolerances, and the need for additional tools such as the development of novel diagnostics for the ultra-fast bunches generated by ANAs, and fast simulation methods.

ALEGRO input for the 2020 update of the European Strategy for Particle Physics: ADDENDUM

ALEGRO collaboration

Abstract

This document provides additional information to support the ALEGRO proposal for R&D relevant to an Advanced Linear International Collider, ALIC, based on high gradient acceleration concepts.

Keywords

Advanced and Novel Accelerators, multi-TeV electron- positron linear collider

Editing Board

Brigitte Cros, Patric Muggli, Carl Schroeder, Simon Hooker, Philippe Piot, Joel England, Spencer Gessner, Jorge Vieira, Edda Gschwendtner, Jean-Luc Vay, Michael Peskin

ALEGRO collaboration members as of September 2018: Erik Adli¹, Weiming An², Nikolay Andreev³, Oznur Apsimon⁴, Ralph Assmann⁵, Jean-luc Babigean⁶, Robert Bingham⁷, Tom Blackburn⁸, Christopher Brady⁹, Michael Bussmann¹⁰, Bruce Carlsten¹¹, James Chappell¹², Jian Bin Ben Chen¹³, Sebastien Corde¹⁴, Laura Comer¹⁵, Benjamin Cowan¹⁶, Brigitte Cros¹⁷, Joel England¹⁸, Eric Esarey¹⁹, Ricardo Fonseca²⁰, Brian Foster^{5,21}, Spencer Gessner¹³, Leonida A Gizzi²², Daniel Gordon²³, Edda Gschwendtner¹³, Anthony Hartin⁵, Bernhard Hidding²⁴, Mark Hogan¹⁸, Simon Hooker²¹, T. Hughes²⁵, Alexei Kanareykin²⁶, Stefan Karsch²⁷, Valentin Khoze²⁸, Pawan Kumar²⁹, Wim Leemans¹⁹, Francois Lemery⁵, Ang Li³⁰, R. Li¹⁸, Vladyslav Libov⁵, Emily Sistrunk Link³¹, Michael Litos³², Gregor Loisch⁵, Nelson Lopes^{20,33}, Olle Lundh³⁴, Alexey Lyapin³⁵, Edu Marin¹³, Mattias Marklund⁵, Timon Mehring¹⁹, Patric Muggli^{13,27}, Pietro Musumeci², Zulfikar Najmudin³³, Uwe Niedermayer³⁶, Jens Osterhoff⁵, Marc Palmer⁴¹, Rajeev Pattathil⁷, Michael Peskin¹⁸, Philippe Piot³⁸, John Power³⁹, Alexander Pukhov⁴⁰, Heather Ratcliffe⁴¹, Marc Riembau⁴², Veronica Sanz⁴³, Gianluca Sarri⁴⁴, Yuri Saveliev⁷, Levi Schachter⁴⁵, Lucas Schaper⁵, Norbert Schoenenberger³⁰, Carl Schroeder¹⁹, Sarah Schroeder⁵, Daniel Schulte¹³, Andrei Seryi⁴⁶, Sergey Shchelkunov^{XX}, Craig Siders³¹, Evgenya Simakov¹¹, Christophe Simon-Boisson⁴⁷, Michael Spannowsky²⁸, Christina Swinson³⁷, Andrzej Szczepkiewicz⁴⁸, Roxana Tarkeshian⁵, Johannes Thomas⁴⁰, Junping Tian⁴⁹, J.V. Tilborg¹⁹, Paolo Tomassini²², Vasilii Tsakanov⁵⁰, Jean-Luc Vay¹⁹, Jorge Vieira²⁰, Henri Vincenti⁵¹, Roman Walczak²¹, Dan Wang⁵², Stephen Webb⁵³, Glen White¹⁸, Guoxing Xia⁴, Hitoshi Yamamoto⁵⁴, Tevong You⁵⁵, Igor Zagorodnov⁵

- ¹ Univ Norway, Oslo, Norway
- ² UCLA, Los Angeles, California, USA
- ³ IHED, Moscow, Russia
- ⁴ Univ. Manchester, UK
- ⁵ DESY, Hamburg, Germany
- ⁶ LAL, Orsay, France
- ⁷ STFC, UK
- ⁸ Chalmers, Sweden
- ⁹ Warwick, UK
- ¹⁰ HZDR, Germany
- ¹¹ LANL, Los Alamos, New Mexico, USA



- ¹² University College London, UK
- ¹³ CERN, Geneva, Switzerland
- ¹⁴ Ecole Polytechnique, Palaiseau, France
- ¹⁵ Univ. Liverpool, UK
- ¹⁶ Tech-X Corporation, Boulder, Colorado, USA
- ¹⁷ CNRS LPGP, Orsay, France
- ¹⁸ SLAC, Stanford, USA
- ¹⁹ LBNL, Berkeley, USA
- ²⁰ IST, Lisbon, Portugal
- ²¹ JAI and Dept of Physics, Univ. Oxford, Oxford, UK
- ²² INO, Pisa, Italy
- ²³ NRL, USA
- ²⁴ Univ Strathclyde, Glasgow, UK
- ²⁵ Stanford Univ., Stanford, California, USA
- ²⁶ Euclid Tech labs, USA
- ²⁷ Max Planck Institute for Physics, Munich, Germany
- ²⁸ Univ. Durham, UK
- ²⁹ Raj Kumar Goel Institute of Technology, Ghaziabad, India
- ³⁰ FAU, Germany
- ³¹ LLNL, Livermore, California, USA
- ³² Univ. of Colorado, Boulder, Colorado USA
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- ³⁹ ANL, USA
- ⁴⁰ Univ. Duesseldorf, Germany
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- ⁴² Université de Genève, Switzerland
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- ⁴⁵ Technion Israel Institute of Technology, Haifa, Israel
- ⁴⁶ JLAB, Newport news, VA, USA
- ⁴⁷ THALES LAS, France
- ⁴⁸ University of Wroclaw, Poland
- ⁴⁹ Univ. Tokyo, Japan
- ⁵⁰ CANDLE SRI, am
- ⁵¹ CEA Saclay, France
- ⁵² Tsinghua University, China
- ⁵³ Radiasoft, Boulder, CO, USA
- ⁵⁴ Tohoku University, Japan
- ⁵⁵ DAMTP, Univ. Cambridge, UK

arXiv:1901.10370v2

✦ First community-wide (and beyond) document!!!

ESPP INPUT



Today: opening talk by Brigitte ...

Represent ALEGRO at ESPP (B. Cros, P. Mugli) ...



<https://cafpe.ugr.es/epps2019/>



4th European Advanced Accelerator Concepts Workshop

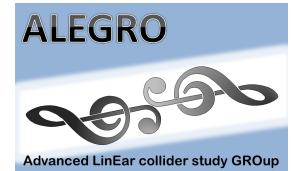
15-21 September 2019

Hotel Hermitage, La Biodola Bay, Isola d'Elba, Italy

Europe/Rome timezone

- ✧ WG8 focuses on developments relevant to advanced linear collider challenges. Progress towards collider components for electrons/positrons will be discussed including:
 - ✧ Electron or positron injectors
 - ✧ High-gradient accelerator modules (plasma, or evacuated media);
 - ✧ Beam Delivery systems (beam transport, synchronization, tolerance)
 - ✧ Staging experiments
 - ✧ Simulations aspects specific to complex systems
 - ✧ Detector and physics case

ALEGRO PROGRESS



- ✧ An advance linear collider is a major goal of the ANA community (long term)
- ✧ It includes intermediate steps: FEL applications (short to mid-term), fixed targets, ...
- ✧ Gathering a broadened community (ANA+...) around a common project: ALIC
- ✧ Gave the community and our work visibility ...

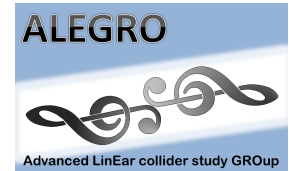
Report from Bruce Carlsten, chair of ICFA-ANA panel, about 2019 ICFA meeting:

“The ICFA committee is interested in ANA technologies and, importantly, approved ICFA endorsement of all our proposed 2018 workshops and conferences.”

“ICFA recognizes the extraordinary impact of ANA technologies and we had a quick discussion about showcasing ANA technologies at next year's ICFA seminar.”

- ✧ Input document to the ESPP
- ✧ Three workshops organized ...
- ✧ Dedicated working group at EAAC 2017, 19, ...
- ✧ Community publications ...

WE ARE HERE



ALEGRO WORKSHOP 2019
CERN 26-29 March

<https://indico.cern.ch/event/732810/>

GOALS OF THIS WORKSHOP



- ✧ Take stock of progress towards ALIC
 - ✧ Speakers instructed to focus on ALIC-relevant topics
 - ✧ How do we address ALIC issues?
- ✧ Include all aspects of ALIC, collider
- ✧ Focus on ALIC first stage

- ✧ Program strongly reflects that ... (DLA: ACHIP week)

- ✧ Write a summary/progress document, to be published: arxiv + journal (Rev. Mod. Phys.?)
 - ✧ each speaker would write a paragraph or two on his/her presentation, ALIC-specific
 - ✧ compiled and submitted as a community document
- ✧ To be discussed ...

- ✧ Determine organizer and location for ALEGRO 2020 ... CERN or other, Europe or other ...

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- ✧ Take stock of progress towards ALIC
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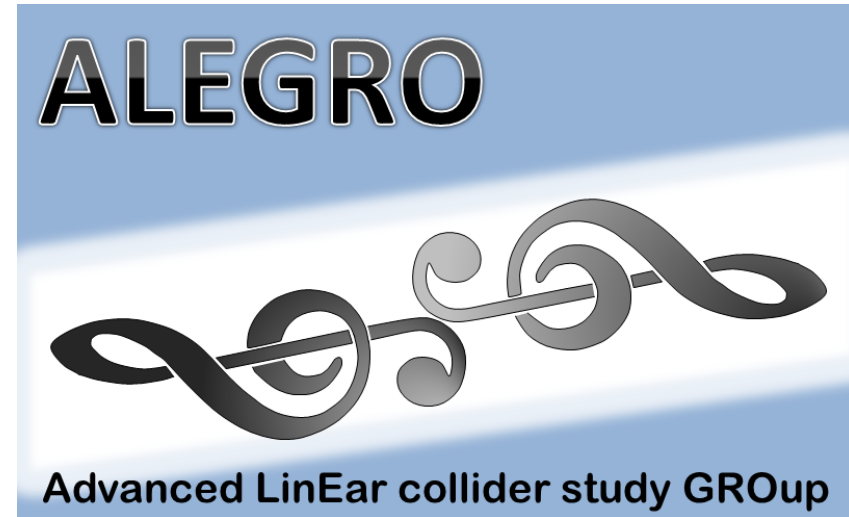
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Warm welcome to the

2019



Workshop

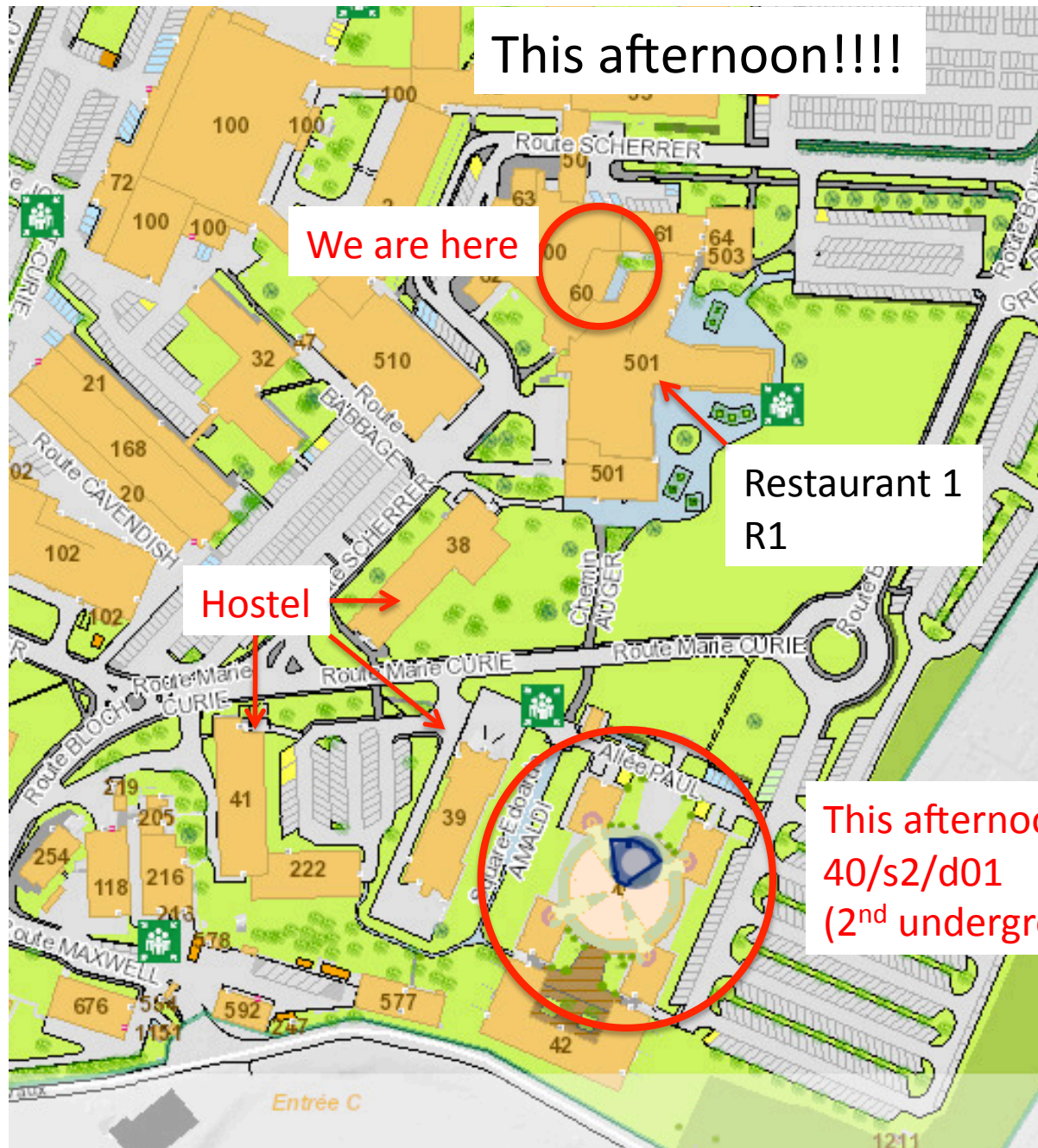
*Thank you in advance for your
participation and contributions!*

PRACTICALS



- ✧ Please, please, please upload your slides on indico ... (remove sensitive material)
- ✧ <https://indico.cern.ch/event/732810/> or email us the slides ... we'll upload'em
- ✧ This afternoon, Salle Dirac 40/s2/d01 (see next slide)
- ✧ Offer workshop cup washing service between breaks, **ALEGRO goes green ...**
- ✧ Angélique is here this morning, then talk to us ...
- ✧ Dinner: TONIGHT (see next-next slide)

PRACTICALS



PRACTICALS

Tram 18

Direction Bachet to go: stop Bel-Air
CERN to come back

Ticket: "Tout Genève", 3CHF each way,
valid 1hour, ~20min. ride

