

Territorial socio-economic impact

Giovanni LAMANNA, *Director of LAPP*

H2020 FCC Innovation Study kick-off workshop

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« Impact & sustainability »**FUTURE
CIRCULAR
COLLIDER**FCCIS – The Future Circular Collider Innovation Study.
This INFRADEV Research and Innovation Action project
receives funding from the European Union's H2020
Framework Programme under grant agreement no. 951754.

This work package will develop the financial roadmap of the infrastructure project and analyse socio-economic impacts pursuing some key goals :

- Estimate construction and operation costs
- Develop a spending profile
- Analyse the socio-economic impacts (with attention to the local ones too)
- Analyse the possibilities for international in-kind contributions
- Identify impact pathways for co-construction of high-tech systems with industrial partners
- Identify territorial and regional benefits in a global project

The work will lead to ranges and likelihoods for different impacts and to the formulation of recommendations for the infrastructure with cost-effectiveness sustainability in mind.

Within **WP4**:

Task 4.4: “Identification of regional and territorial benefits”

LAPP-CNRS leads,

(assisted by Cerema and CERN, CETU, CSIL and partners BINP, DOE, Etat de Genève and DRRT-Auvergne-Rhône-Alpes)

and using the **impact pathways approach** and **value chain analysis**, will perform studies of potential regional impact :

- develop a model for the territorial benefit potentials
- work with beneficiaries and partners on potential local effects of the construction project and the long-term operation of the infrastructure in the region.
- interface with regional industrial partners, stakeholders of different interest groups and host-state notified bodies, to develop regional development scenarios together.

-> « **One topic will be the study of creating a second technology pole for the research infrastructure, leveraging the existing CNRS-LAPP laboratory.** »

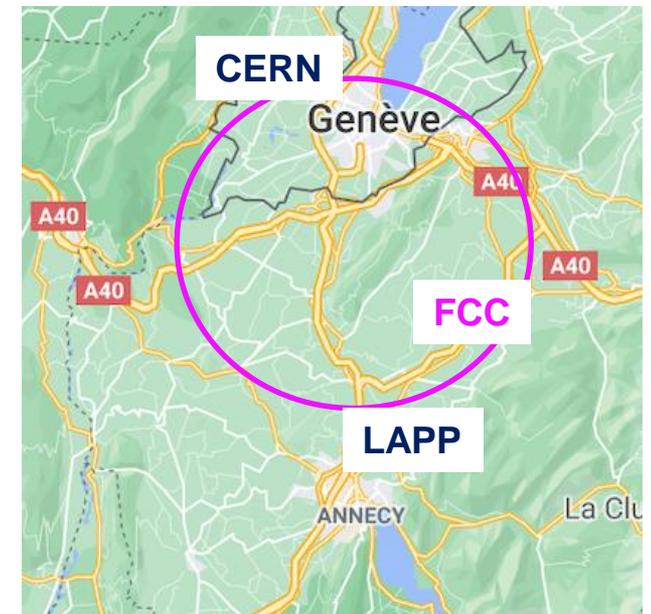
Created in 1976, **LAPP** “Laboratoire d'Annecy de Physique des Particules” is a laboratory of the **CNRS** National Institute for Nuclear and Particle Physics (**IN2P3**) in France and University Savoie Mont Blanc (USMB)



Particle and Astroparticle physics.

Combination of the experimental investigations of the two infinities, from the largest-scale structures in the observable Universe to the most fundamental particles

LAPP-CNRS campus in Annecy:
10 000 m² buildings
2 hectares



LAPP was born **45 years ago** by the wish of CNRS scientists to have a French laboratory close to CERN.

For the FCC perspective, it is seen by IN2P3-CNRS as the potential French Gateway to CERN.

Today more than **150** researchers, engineers, technicians, administrative personnel, students..

Frontier **technologies** in different fields:

- mechanics,
- electronics,
- mechatronics,
- computer science,
- scientific and control software and e-infrastructures.

Important involvement (@CERN) in LHC (ATLAS, LHCb), HL-LHC, CLIC and FCC.

LAPP hosts the **MUST** multidisciplinary Data and Computing Centre : WLCG Tier2/ ATLAS Nucleus, multidisciplinary USMB and CNRS computing platform and ESCAPE/data-lake pilot center.

LAPP hosts a Theory Laboratory (LAPTh) within its premises.

Physics in Haute-Savoie, in the **Alpine Furrow** (from Geneva to Grenoble) is a question of “**excellence**” and “**cultural heritage**”



Including strong cooperation with neighbouring countries (CH,IT)

Communications:

- **FCC Physics Week conferences** organised by **CNRS-LAPP** (Annecy) and **ULIV** (Liverpool) in a different country each year, **active participation in society** for benefit-cost analysis conferences.
(FCC Week conferences will be organised in a different country each year.)
- **Travelling exhibition** in public spaces targeting the host states France and Switzerland **to raise an interest of the science mission**, the opportunities for societal and economic growth and the implementation scenarios in the region.
- **Opening events** of the exhibition with national authorities and involvement of schools and universities to engage a young audience.
- Dedicated **summer schools** will be considered.
(ex.: CNRS-IN2P3 is supporting plans for a new hostel/work-space for summer students in Annecy for HL-LHC and FCC)

Ideas for further regional cooperation:

- Potential regional collaborations with laboratories in Grenoble as well as with neighbouring countries in Switzerland (Geneva, Lausanne) and Italy (Turin, Milan) to be explored
e.g. accelerator R&D, European training networks, FCC as a facility for more disciplines than HEP, etc.

The territorial development will yield a list of innovation possibilities that support regional economic growth and social wellbeing.

Examples include, but are not limited to:

- the creation of a high-tech and education pole in the Annecy region (France) through the CNRS LAPP research centre;
- modernized electricity, telecommunications and transport networks;
- new cultural activities and opportunities for high-quality tourism around CERN and for the FCC sites;
- the development of common projects with industrial partners;
- the development of concepts for
 - supplying waste-heat from the particle accelerator and its technical infrastructures,
 - reducing cooling water usage and for more efficiently making use of the existing water in the region for use cases beyond the research infrastructure;
- possibilities to increase locally and share computing and data handling infrastructures for communities beyond particle physics research.

@LAPP:

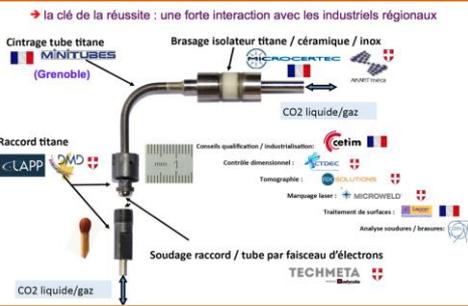
- Long-term and strong partnership with the socio-economic environment, with local territorial authorities and Universities (USMB and UGA).
- Capacity in leveraging European Union framework projects for Regional goals (e.g. combining H2020 and FEDER).
- Long-term cooperation LAPP-CERN-Haute-Savoie-Departement-Rhône-Alpes-Region on R&D accelerators, innovation, technical training and physics.

Inspiring our perspective work for FCC and its territorial networking...

Exemple 1

ATLAS detector R&D and construction

Network of local/regional subcontractor SMEs



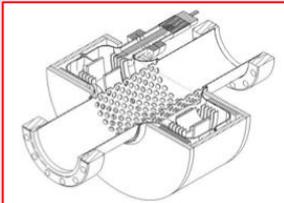
Exemple 3



LAPP cooperation with regional competitiveness clusters such as CIMES, dedicated to Creation of Integrated MEchanical Systems bringing together companies (SMEs and groups), research centers, educational establishments with the aim of accelerating innovation

Exemple 2

LHC construction PRAC collaborative programme: French government, Region, CERN and CNRS-LAPP Accelerator construction and education schemes for engineers and technicians

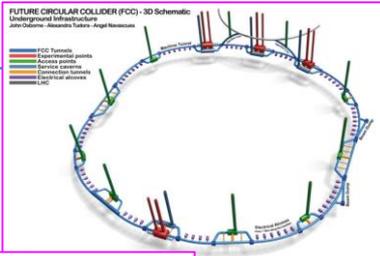


Exemple 4



LAPP into the Region's research, digital and industry 4.0 plans:

- stay at the forefront of Big Data technologies and skills;
- contribute to the dissemination of knowledge for education society and the business community.



Le Grand Anecy se hisse au rang des plus grandes communautés d'agglomération françaises.

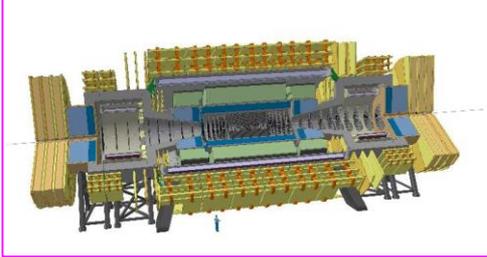
Large urban area
(539 km², >208 000 inhabitants)

- Haute-Savoie is the French department with the highest demographic growth and GA (1/4 population) is no exception.

- 30 000 more inhabitants in ten years in Grand Anecy.

- 100,000 jobs,
- 44 economic activity zones,
- 10,000 students,
- 42 training establishments,

- 4 centres of excellence
(mechatronics, image/creative industries, sport and business tourism)



FCC infrastructures in Haute Savoie will result from

- **an impact pathways approach;**
- **a value chain analysis;**

-> shaping the way to establish CERN in the region.

Potentially by three complementary paths (to be investigated in FCC-IS WP4).

- 1. The accelerator and detector infrastructures, the technical/access pits and the experimental pit with the detector access, control rooms and more dedicated on site offices and facilities.**



Construction plans implies:

- geological studies;
- minimization of environmental impact;
- urbanistic infrastructures;
- water, electricity and telecommunications management;
- computing and data infrastructures management;
- science tourism;
- ...



The findings will be integrated in the:

- *design of the particle collider (WP 2) and*
- *the territorial scenario (WP 3)*

for a final most sustainable operation plan.

2. A technopole (e.g. the CERN-Prevessin site) motivated by the distance from Meyrin and aimed at delocalizing the operation facilities along the ring.

Major (Meyrin) functionalities deported/duplicated on site:

- Technical workshops for
 - (i) Continuous development;
 - (ii) Construction and assembly;
 - (iii) Maintenance.
- Accelerator and machines control room;
- Services and infrastructures control site;
- Security and safety (e.g. fire brigade);
- Storage;
- Logistics, electrical and computing French hubs;
- ...

Scope and impact evolving with time:

- From logistics and geological works hub (during excavation) to assembly and on-site operation phases.



Aimed at not being a satellite but a second “core” CERN technical pole (because of the impact pathways approach, transport minimization, local impacts and benefits ...)

3. A CERN-French new center where a new *Big-Science* Research Infrastructure such as FCC needs to integrate and contribute to innovation, culture, education, environment and sustainability plans of a large urban area ...



Installing a RI in a urban context and not on a rural place (as at CERN origins) implies some recommendations:

- Combine cost-effectiveness sustainability and social wellbeing by leveraging the existent research and economic ecosystem.
- Privilege hosting FCC users on site and reduce individual (cross-boarder) people transportation in the Geneva region.
- Apply subsidiarity and complementarity values by establishing and privileging scientific and engineering studies, research and training on site.
- Integrate, inspire further and reinforce soon, the current Grand Annecy horizon-2050 plan on fields like environmental impact, mobility, research and education, energy resources, smart working, health, services to citizens and smart city.
- Leverage the Savoie and Grenoble Universities. Help in bringing closer one another CERN, research and high-tech excellences within the Alpine furrow.
- Consider “citizen science”, tourism and quality of life

Summary: large partnership of Science with Society

As part of the feasibility study for FCC we'll investigate the tunnel construction with the **establishment of CERN in Haute Savoie according to a three-fold potential vision:**

1. The accelerator and detector infrastructures, the technical/access pits and the experimental pit with the detector access, control rooms and more dedicated on site facilities.
2. A technopole (e.g. the CERN-Preveessin site) motivated by the distance from Meyrin and aimed at delocalizing the operation facilities along the ring.
3. A CERN-French new center where a new *Big-Science* Research Infrastructure such as FCC needs to integrate and contribute to innovation, culture, education, environment and sustainability plans of a large urban area ...



Success and sustainability rely on a committed user community, including the local (academic and not only) ones, to support and actively participate in such a long-term research programme.

WP4 – Taks 4.4. territorial development opportunities

A “science & society study group” could be established. Studies and events for networking to structure opportunities and interact with a complex territorial ecosystem will be planned. e.g. Initiate “Science, Innovation and Society international forum” (*to be explored*)

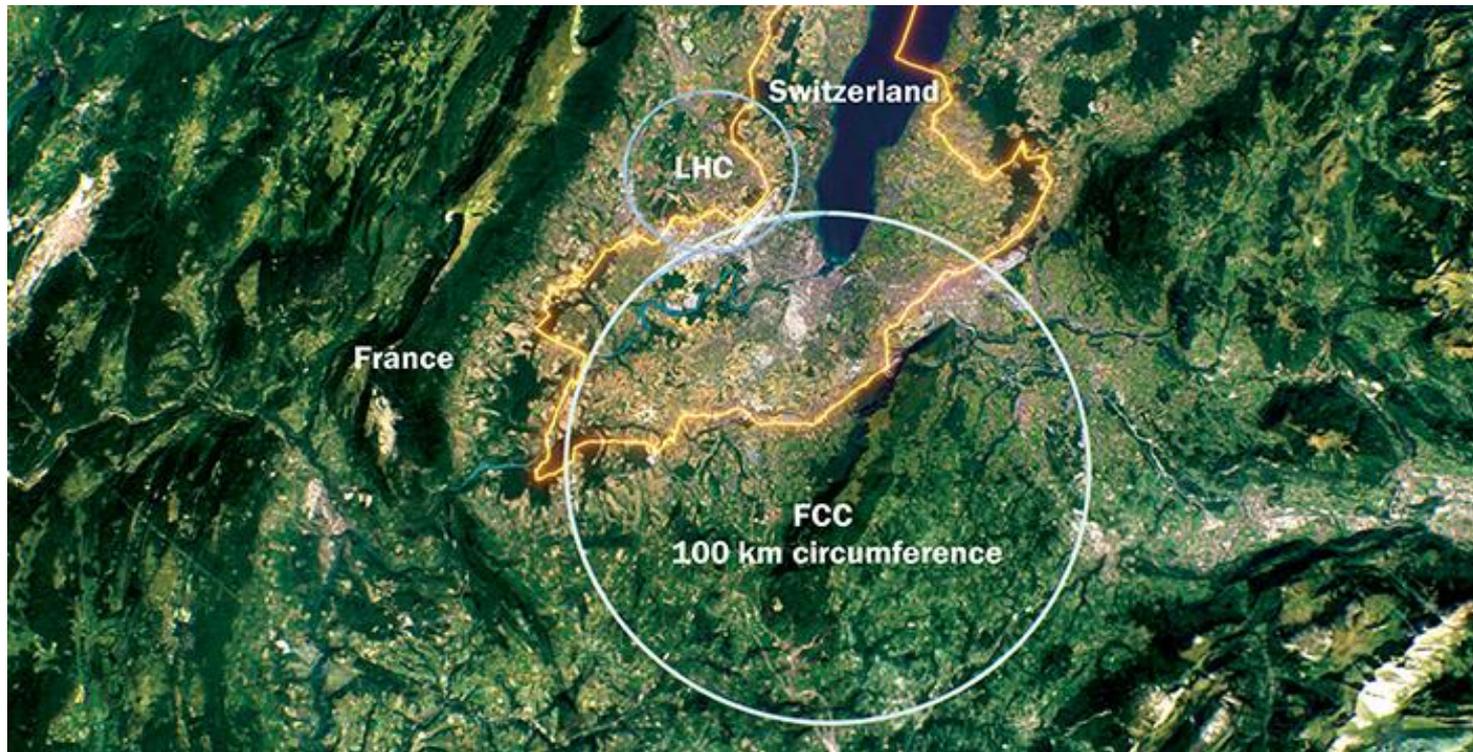
WP3 and WP4 together will deliver a briefing booklet on regional development opportunities

Information for funding agency management and government agencies, for potential partners from industry and academia concerning **regional and territorial development opportunities** with investment and benefit estimates and recommendations for funding instruments for preparing project development plans.

WP4 final report about regional benefits and territorial/global development opportunities

A report that summarises proposals for territorial (France, Switzerland) infrastructure service developments and for regional development potentials in nations that can contribute to the particle collider and physics programme.

Thank you.



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