



# CHART (Swiss Accelerator Research & Technology)

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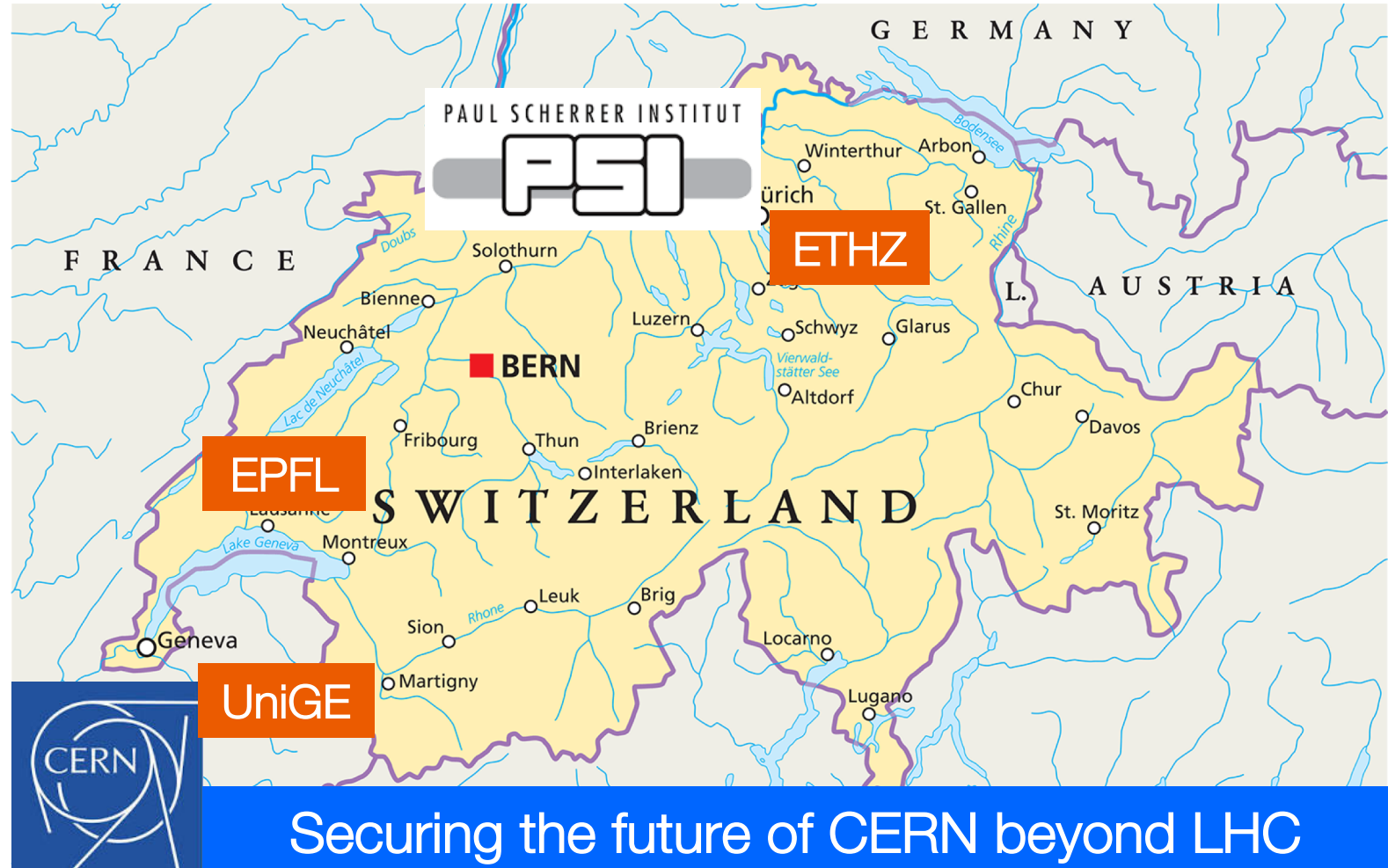
Lenny Rivkin  
EPFL/SB/IPHYS/LPAP and Paul Scherrer Institute



# Swiss Accelerator Research and Technology CHART Collaboration

- development of future accelerator technologies  
Emphasis: **high field magnets**
- development of accelerator concepts beyond the existing technology for synchrotron light sources, medical and industrial applications

Commitments from SERI, ETHs, PSI, UniGE and CERN for a total sum of 40 MCHF to fund these activities for the next 5 years



# CHART II 2019 - 2023: mainly FCC

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High field magnets R&D (**PSI**, EPFL, UniGE, ETHZ)

16 Tesla magnets, NbSn3 technology

20 Tesla magnets, HTS technology

Particle collider design (**EPFL**, UniGE, PSI)

Beam dynamics studies

Collimation, materials at extreme conditions

Advanced Acceleration methods: Laser and THz acceleration (**PSI**, EPFL)

## Area: Superconducting (SC) Magnets

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The goal is to design, build, and test superconducting-magnet models according to strategic needs of the FCC design study:

- To build the CCT option of a 16-T Nb<sub>3</sub>Sn dipole short model for FCC-hh
- To develop 2-m-long prototypes of 16-T Nb<sub>3</sub>Sn dipoles, possibly of different coil geometries, up to the pre-industrialization stage
- To establish the infrastructure needed to build and test all aspects of FCC-hh, HE-LHC magnets and other SC accelerator magnets
- Superconducting wire production development (FCC specification)



# High Temperature Superconducting (HTSC) Magnets

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The goal is to design, build, and test high temperature superconducting-magnet models according to CERN and PSI strategic goals in view of future application for the FCC magnets:

- **Develop technologies** for HTS based accelerator magnets
- Design, build, and test an HTS variant of the **SLS 2.0 superbend magnet**
- Design, build, and test several periods of an HTS **undulator magnet**

# Area: Collider Design Beam Dynamics and Technology

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The goal is to continue the studies of beam stability as well as of beam containment concepts according to strategic needs of the FCC design study for both lepton and hadron colliders and to develop associated technologies

- **Beam stability**: Beam-beam, Landau damping mechanisms
- Development of diagnostics tools
- Beam containment concepts: **collimation and protection**
- Technological developments in the domains of beam cleaning, collimation and machine protection and associated **material- and vacuum studies**

## Area: THz Laser Acceleration

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The goal is to investigate further the advanced high gradient THz acceleration of relativistic electrons according to PSI and CERN strategic goals:

- Development of dielectric structures for THz high-gradient acceleration
- Acceleration with several MeV energy gain.

# CHART applications

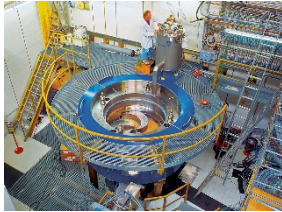


proton therapy

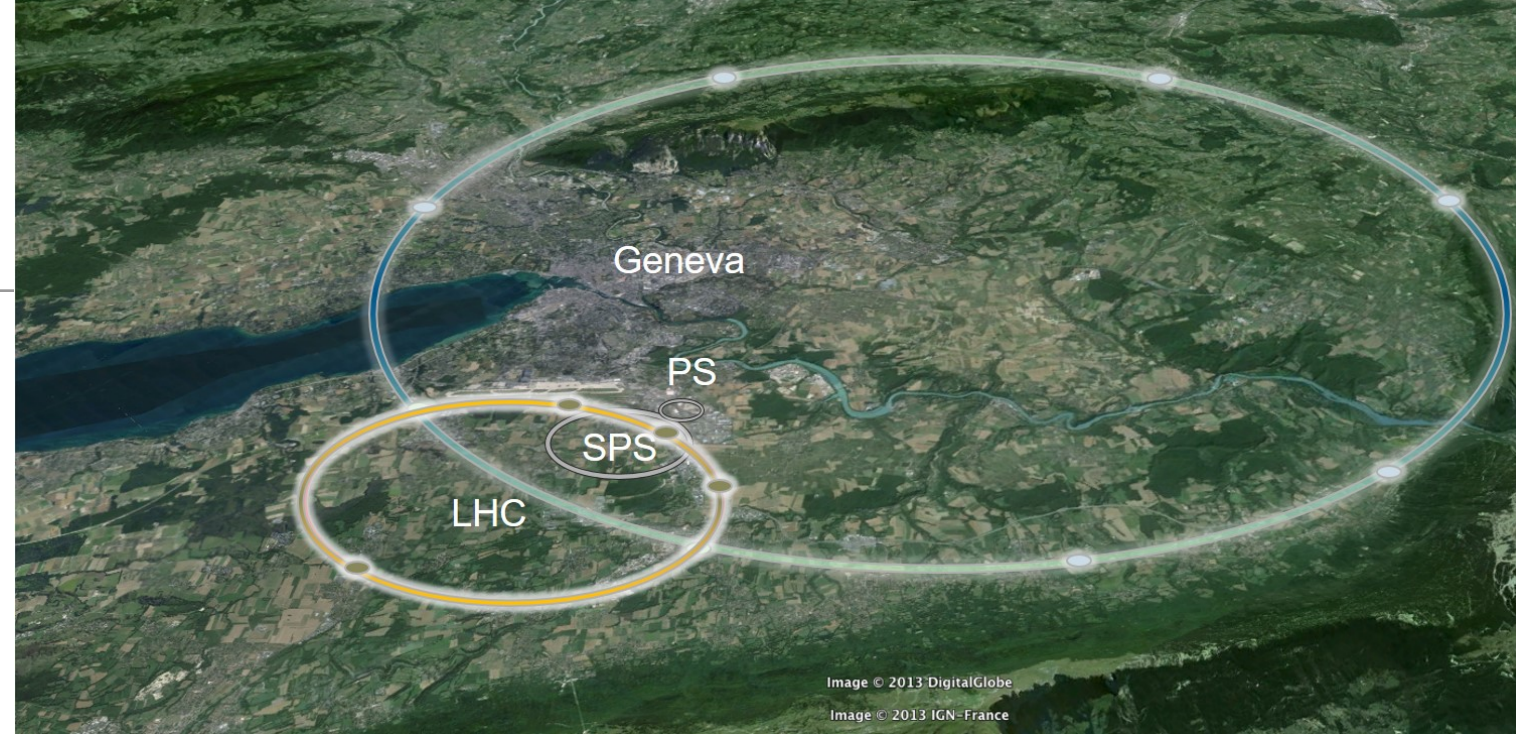
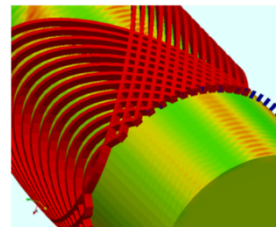


imaging in  
medtech  
& industry

accelerators  
for medtech



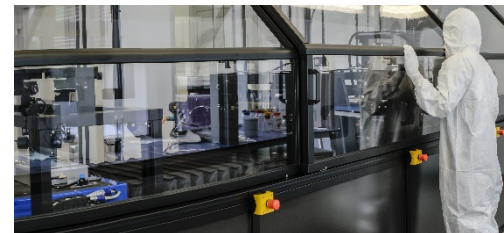
superconducting cables & compact magnets



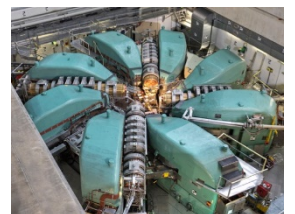
technologies not only for the future of CERN, but...

...for industry

advanced manufacturing  
processes and diagnostics

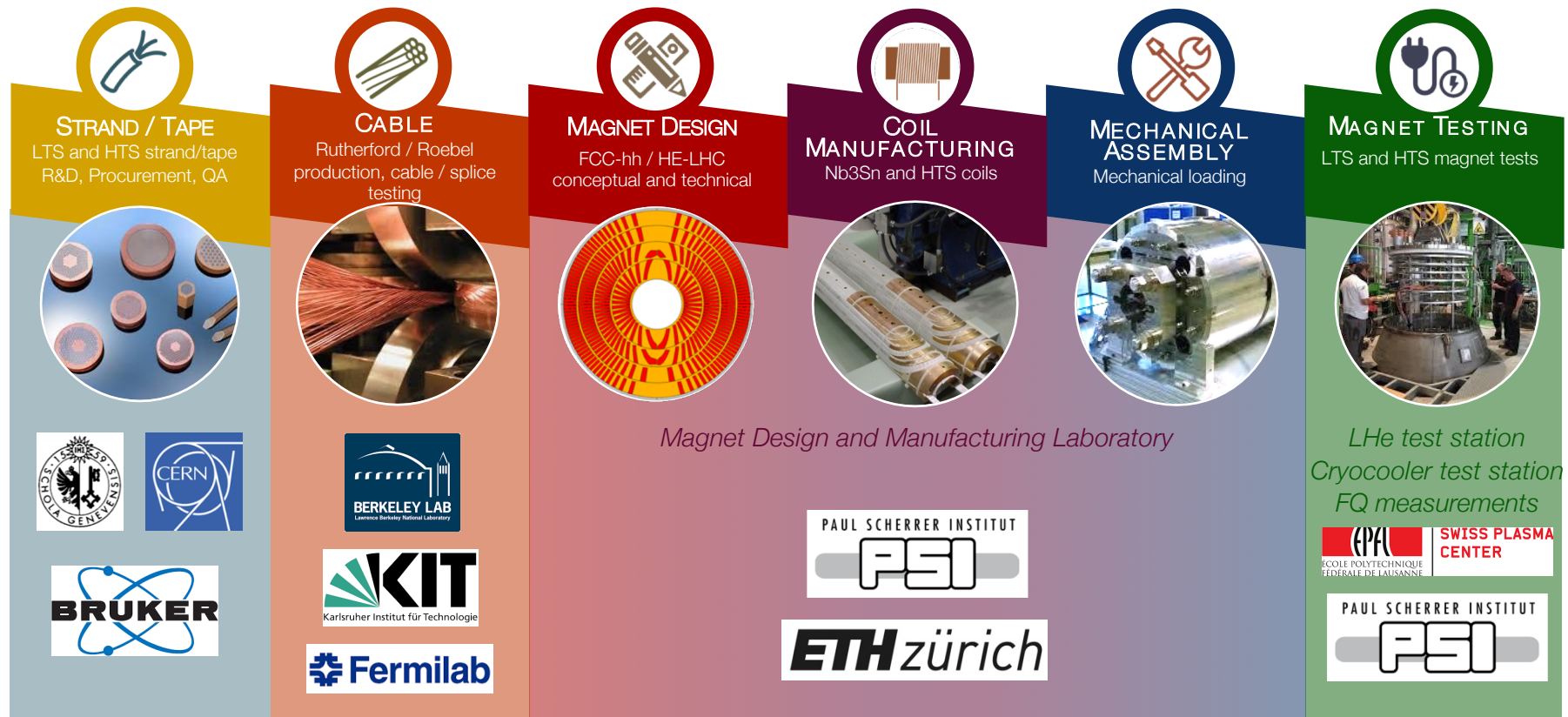


analytical  
research  
facilities

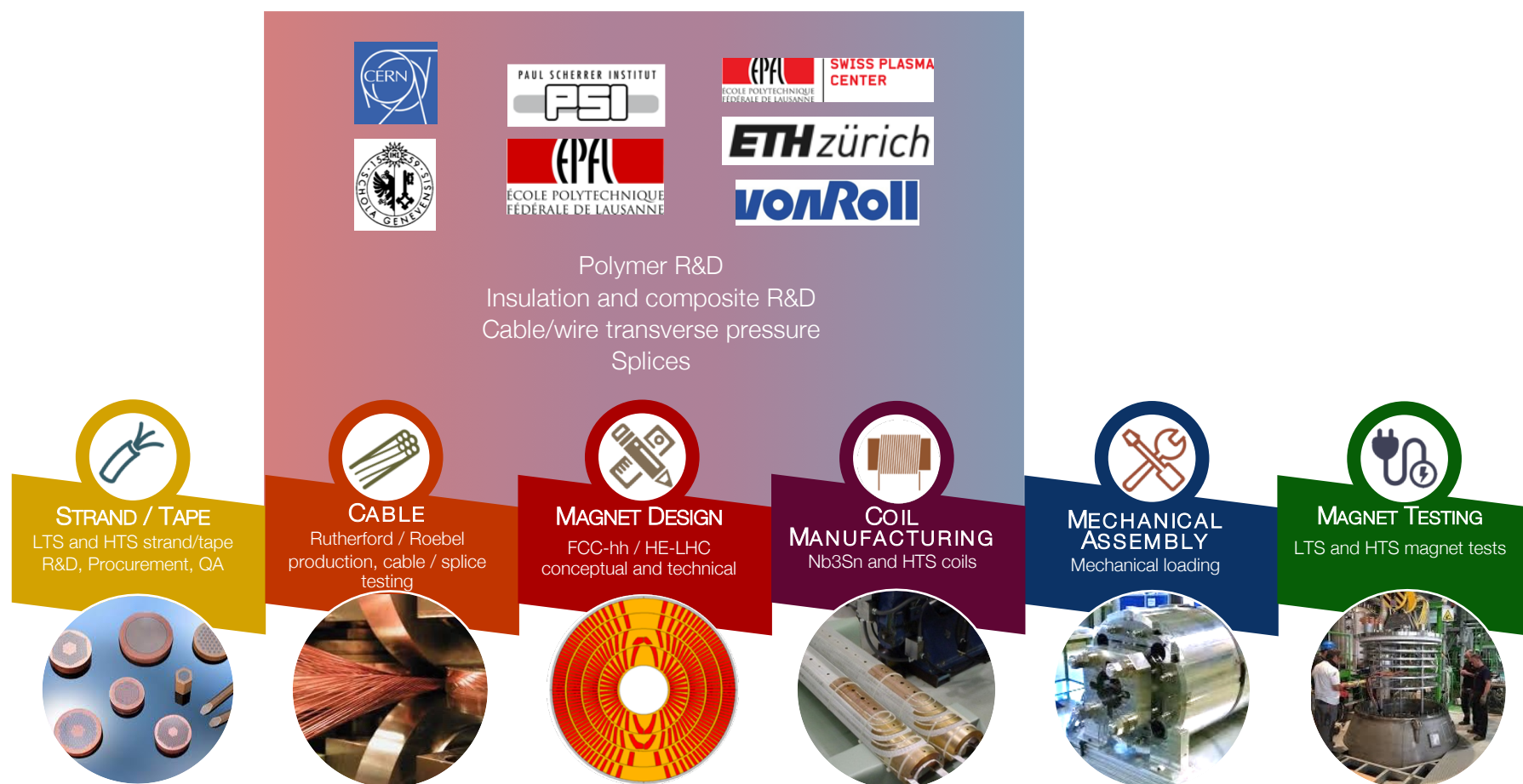




# CHART Magnet R&D – Main Competences



# CHART Magnet R&D – Supporting R&D



# CHART Magnet R&D – Supporting R&D

