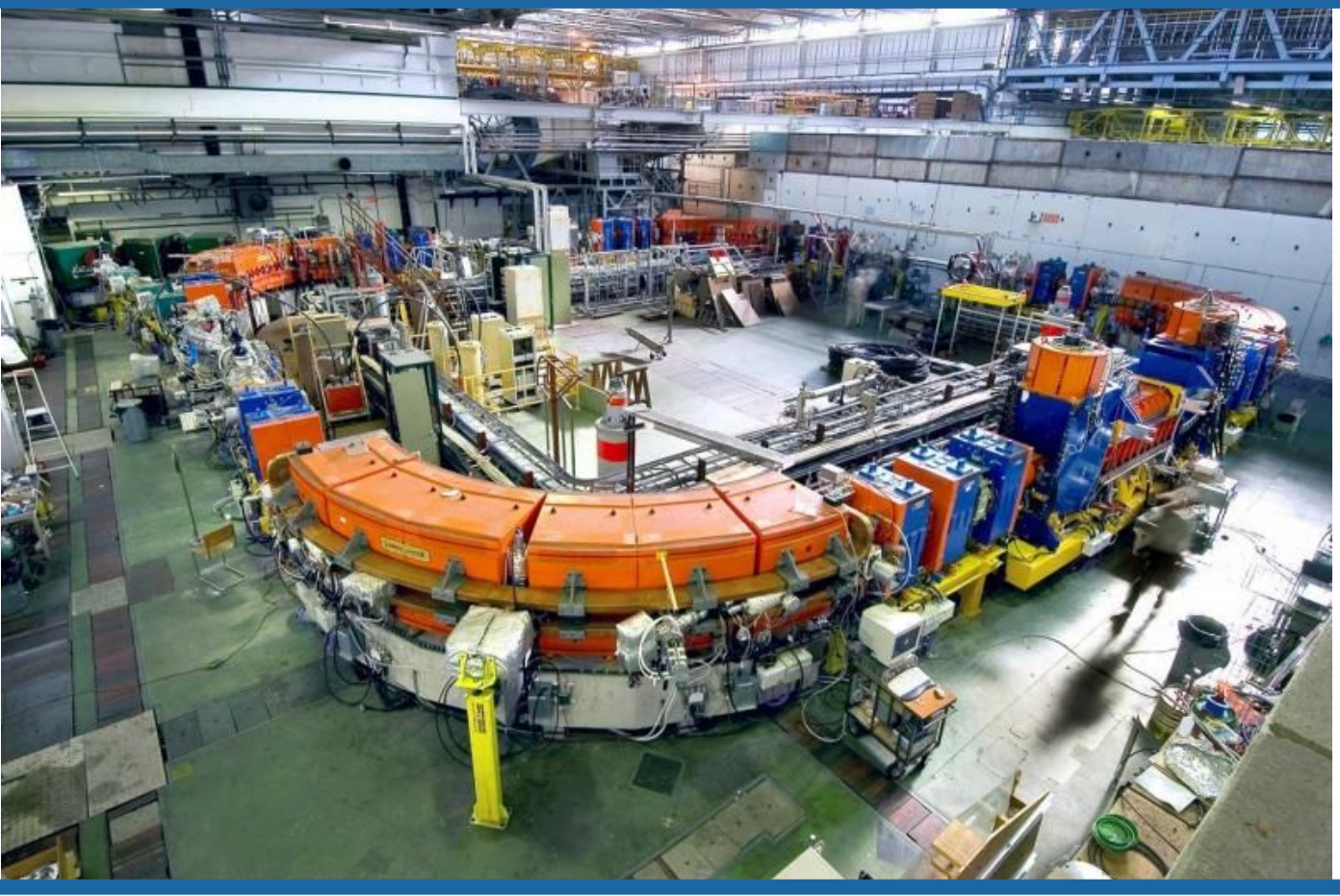
ENLIGHT Annual Meeting 2016
Utrecht, The Netherlands, 15-17 september

Bio-LEIR: A CERN FACILITY FOR MEDICAL APPLICATIONS



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OpenMED at CERN

- Mandate by CERN Council for ➡ CERN Medical Applications
- Divonne meetings (2014, 2016) outlined the research programme.
- CERN Medical Application Strategy to be presented to ➡ next CERN Council

- PARTICLE THERAPY has a worldwide expansion, with ~ 30 Centres in Europe, but it remains in development.
- Need for an open-access Biomedical Facility dedicated to non-clinical research (no patients, no animals).

A Biomedical Facility (Bio-LEIR) at CERN,

to provide particle beams of different types and energies

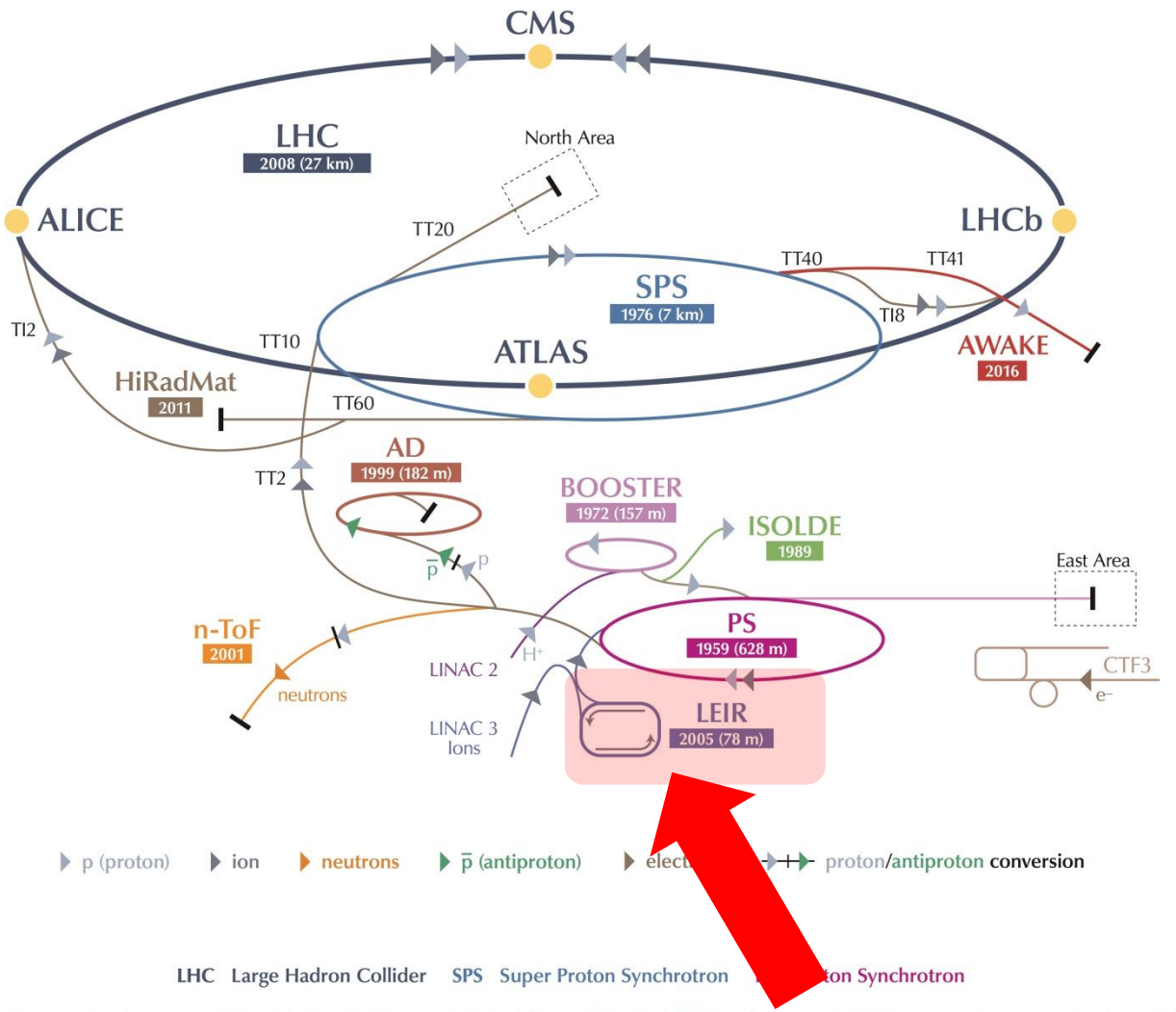
to external users for the purposes of:

- Detector development for nuclear activation around the Bragg peak and imaging
- Ballistic characteristics of ionic beams in humanoid phantoms.
- Systematic Radio-Biology Experiments with tumour and healthy tissues.
- Iterative experimental verification of simulation results.

FINAL OBJECTIVE ✉ Ideal Design and Construction of an Accelerator Prototype for PARTICLE THERAPY

Why at CERN?

CERN's Accelerator Complex



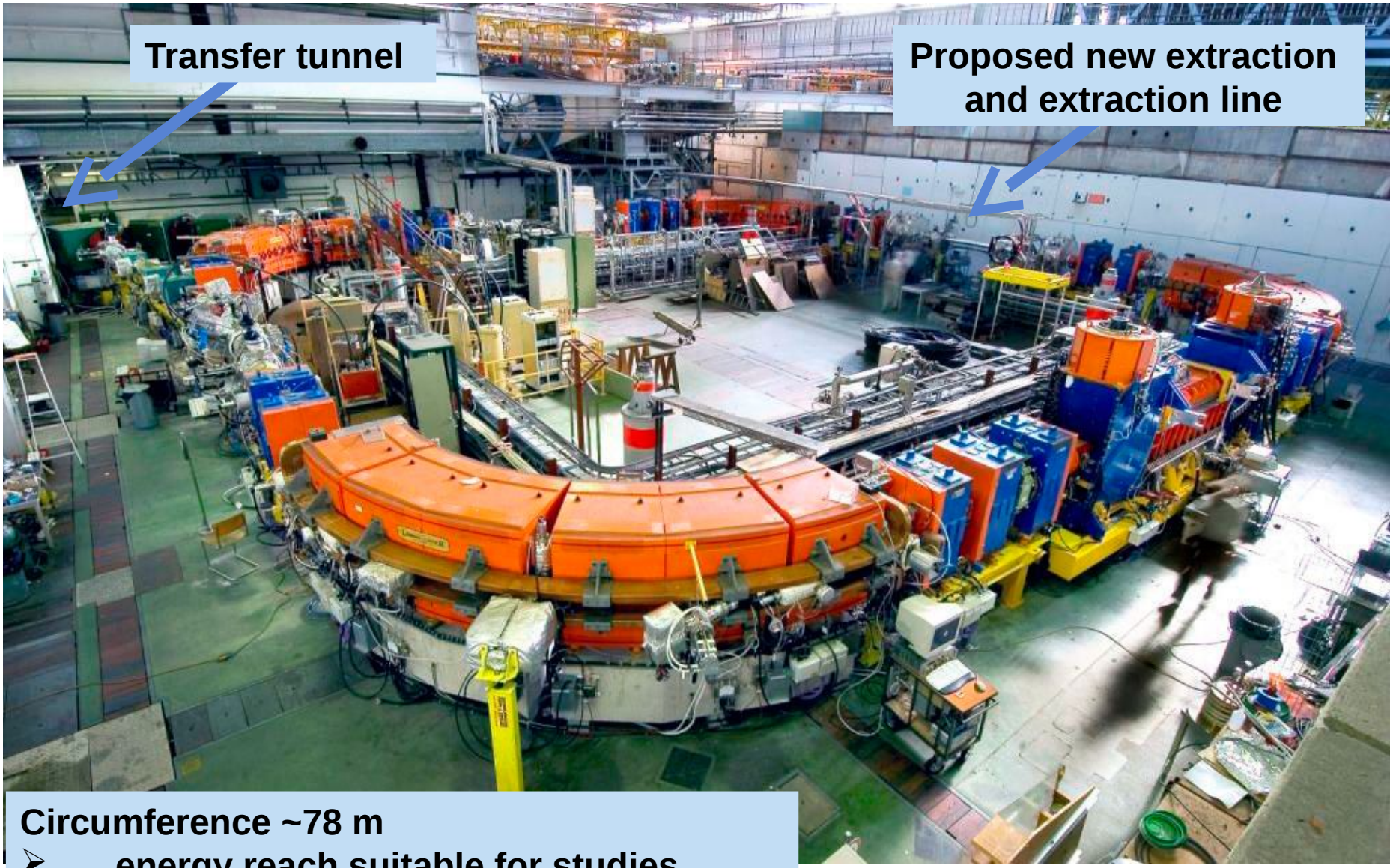
THE LOW ENERGY ION RING

LEIR is a small synchrotron with a circumference of about 78 m.

- Built as an antiproton ring in the 90's, it was later transformed into a heavy ion injector for the SPS and the LHC, receiving particles from Linac 3.
- In order for LEIR to be able to provide ion beams with appropriate energies for studies of interest for biomedical applications, **a new ejection system with new beam lines needs to be designed**.
- In addition, Linac 3 could be upgraded to include **a second ion source and a radio frequency quadrupole (RFQ)** optimized for ions of interest for biomedical studies: p, He, Li, C,O, Ne.
- The biomedical-related activities could take place **in "time-sharing mode" with LHC ion runs**.

  Bio-targets (i.e. human cells, both malignant and normal) could then be tested in the beamlines, as well as innovative dosimetry systems, radiation detectors, and radiography and tomography devices.

OPENMED – Bio-LEIR



Circumference ~78 m

- **energy reach suitable for studies of interest for hadrontherapy**

A FACILITY FOR EXTERNAL USERS

A good model for Bio-LEIR operation could be that of ISOLDE at CERN, with more than 90 % of EXTERNAL USERS.

➡ Bio-LEIR could be operated
by a **Collaboration between countries plus CERN**.

The conditions are to be established, like for any "experiment" at CERN Facilities, by a **Memorandum of Understanding (MoU),** signed by the Funding Agencies.

➡ Bio-LEIR should become an European Large Scale Facility, allowing users to have access to the funding calls of the European Commission.

➡ **Bio-LEIR Experiments Committee (BLEC)**

- It should take over the duty of evaluating proposals for experiments on the Bio-LEIR.
- The BLEC would work on a basis of few meetings per year.
- The committee's conclusions and recommendations
  are transmitted to the Research Board by the Chairperson
  which takes final decisions in particular on approval of experiments.
- The chair is normally a non-CERN scientist.

CONCLUSIONS

- Importance of making
  Bio-LEIR Facility at CERN happen.
- It will catalyse and boost the Biomedical Research in Europe as a powerful means to fight cancer.
- Ideal place to train the next generation in the field of Medical Applications of Physics.
- Hosted in the Leader Lab. in Science, the interdisciplinary environment will provide an ADDED-VALUE for the objective of

PHYSICS FOR HEALTH