

From Yesterday's Presentation

Next-generation RIB facilities: unprecedented era of nuclear science

Thousands of new isotopes to be produced

Q: How do we avoid “stamp collecting”?

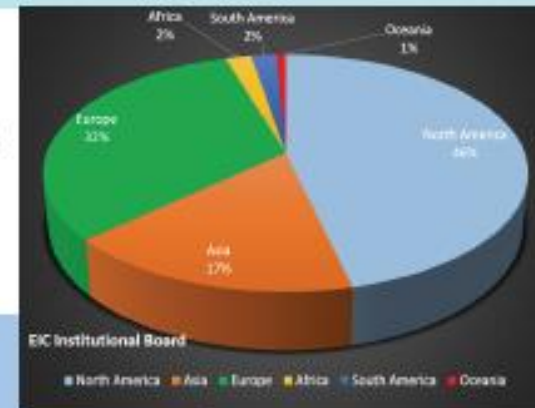


EIC – An International Effort

❑ EIC Users Group – *EICUG.ORG*:

705 collaborators, 29 countries, (no students included as of yet)
162 institutions... (August, 2017)

Map of institution's locations



The EIC Users Meeting at Stony Brook, June 2014:

→ <http://skipper.physics.sunysb.edu/~eicug/meeting1/SBU.html>

The EIC UG Meeting at University of Berkeley, January 6-9, 2016

<http://skipper.physics.sunysb.edu/~eicug/meeting2/UCB2016.html>

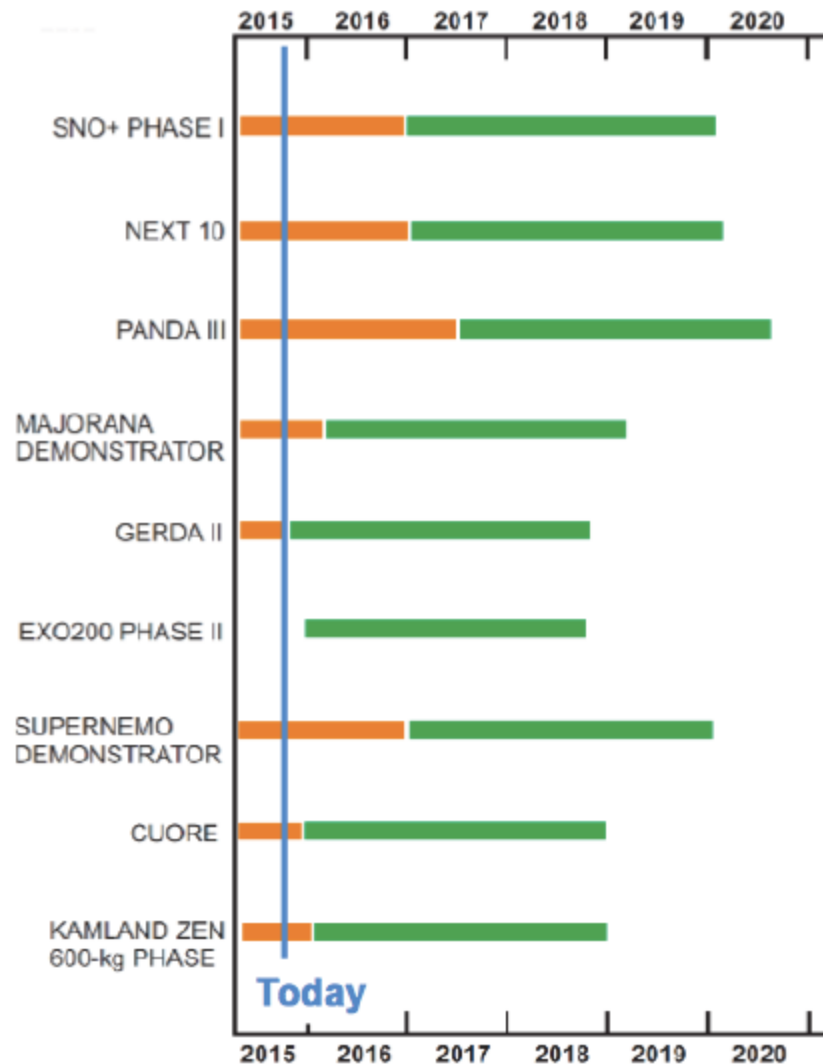
Recent EICUG Argonne National Laboratory July 7-10, 2016

<http://eic2016.phy.anl.gov>

Remote/Internet: meeting: March 16th : For NAS Review preparation

Most recent meeting: July 18-22, 2017: Universita, Degli Studi Di Trieste, INFN, Trieste, Italy

U.S. NSAC Timeline (10/2015)



- 2-3 year horizon for decision process of tonne-scale detector
- Develop R&D towards down-select of technology and longer term possibilities
- Develop theory support
- Support common challenges

Construction

Operation

(not time until downselect)

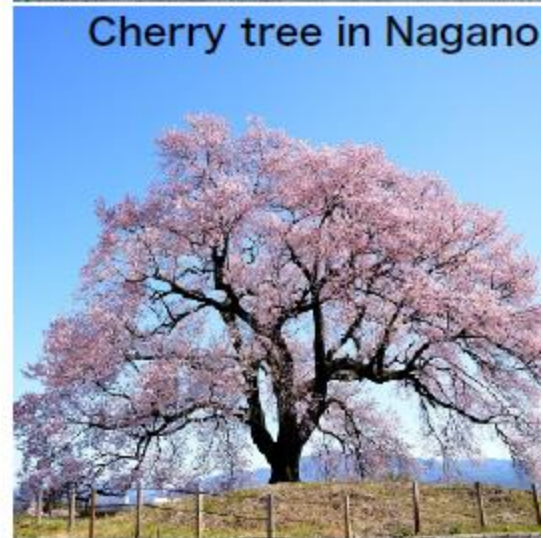
Symmetry Breaking !

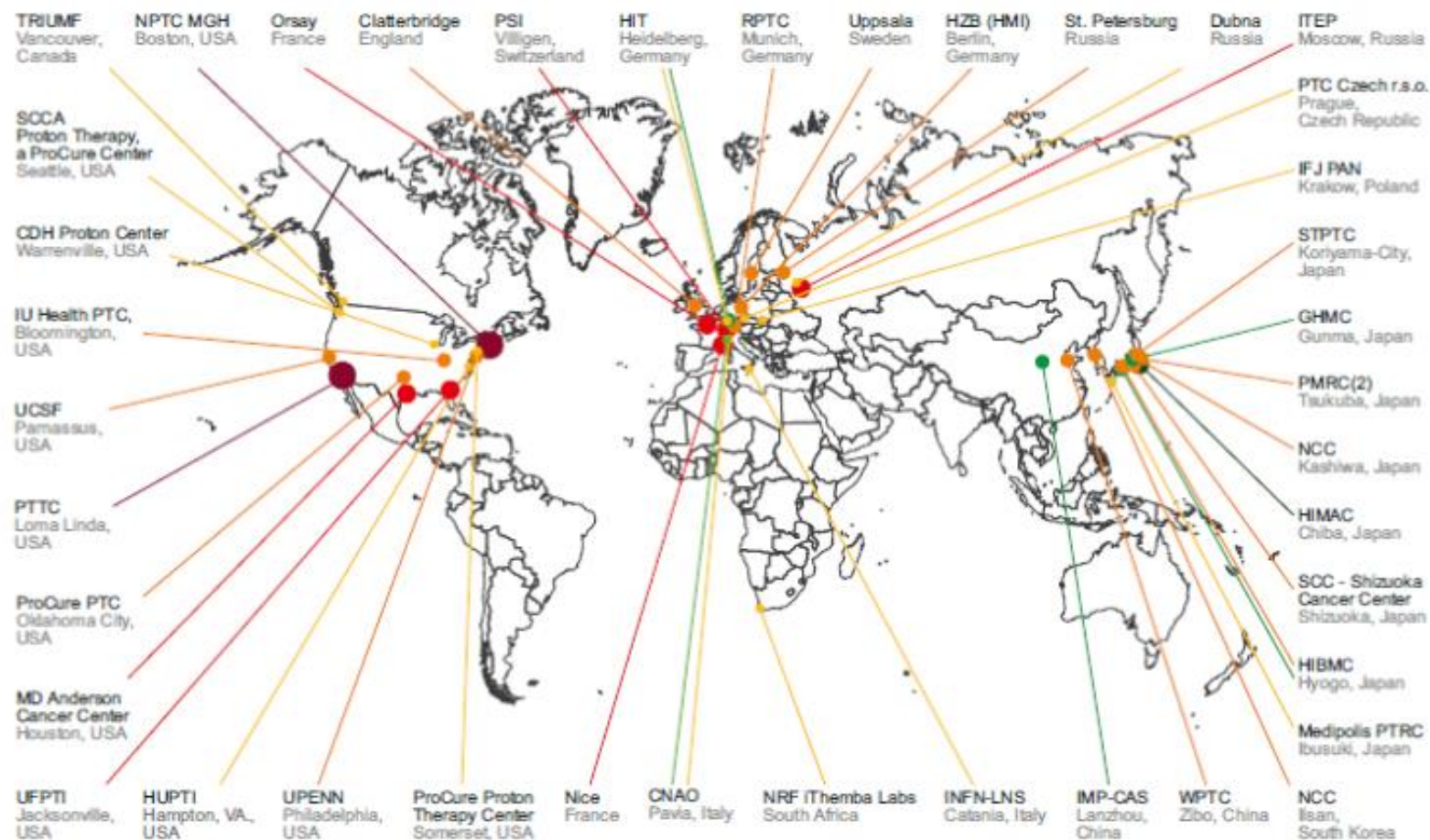


Cherry tree in Sion



Cherry tree in Nagano





June 2017: 52 proton/11 carbon ion

Estimate of >200 centers in 2021



report „Nuclear Physics in Medicine“, 2014

**A presentation of the outlook and priorities (that are in the public domain) by each of the funding agencies representatives
(10 min. each)**

Two Major Issues

- A discussion of international cooperation for the large scale nuclear science projects. Could the role in this by IUPAP WG.9 be made more explicit?

International project (cannot be built/
operated without international collaboration,
though WG9 must help define more explicitly)

National project

- The open access to the various large nuclear science laboratories and the question of user-fees.

IUPAP Guideline

- In the past, almost all accelerator facilities follow “IUPAP Recommendations for the Use of Major Physics Users Facilities (1996)”
<http://www.iupap.org/ga/ga22/majfacil.html>
- 3.2 The criteria to be used in selecting experiments and determining their priority are:
 - scientific merit
 - technical feasibility
 - capability of the experimental group
 - availability of the resources required
- 3.5 Host facilities should not normally require experimental groups to contribute to the running costs of the facilities (including associated experimental areas and equipment normally maintained by the facilities). Exceptions to this Recommendation may be made in special circumstances or in the case of proprietary research, which we define as research the results of which are not intended for timely disclosure in the open scientific literature.

**A discussion of international
cooperation for the large scale
nuclear science projects.
Could the role in this by IUPAP
WG.9 be made more explicit?**

- For Facilities
 - Now is a time to consider positively International collaborations and co-operations for “**International**” facility projects. Larger fraction goes to the host country but other shares and responsibilities are better to be defined at the beginning of the project planning.
 - The cost for **National** projects shall go mostly to the host country.
 - Similar facilities in nearby countries should be discussed, including possibility of collaboration.
- For Experiments
 - Experimental costs are assumed to be covered by participating countries (like before).
- Discussions on the first points are better to be discussed in each WG9 meeting, by including all the stake holder countries.

**The open access to the various
large nuclear science laboratories
and the question of user-fees.**

- For Facilities

- In the future, the international contributions to the operational cost may be negotiated (need some discussion) for the “**International**” facility projects.
- How??? Many new ideas need to be considered.
- **National** project cost shall go mostly to the host country.
- We continue to support the concept of regional reciprocity

- For Experiments

- All experimental projects will be assumed to cover by the participating countries.

- Europe
 - France: SPIRAL2 “Phase 2” need to be **international**.
 - France: Work in many projects in other countries, high expectation to the US EIC.
 - Great Britain: Participations to many foreign projects. Periodic review.
 - Italy: Frascati (kaonic atoms), Gran Sasso (LUNA MV nuclear astro), Legnaro (RIB...) and Catania (upgraded cyclotron).
- US + Canada
 - Canada: Three funding agencies to nuclear physics. TRIUMF, SNO, ATLAS, T2K.
 - USA: Budget is unknown. RHIC incl. sPHENIX. J-Lab Upgrade. FRIB welcomes international participation.
 - USA Future: EIC (2021???) and Neutrinoless Double Beta (level of tons), these two must be **international**.
- Africa
 - Separated Sector Cyclotron in National Research Foundation.
- Asia + Australia
 - China: Heavy-ion Project (HIAF), CIADS, underground laboratory (JINPING) and JUNO.
 - Australia: Heavy-Ion Accelerator in Canberra. Underground lab (SUPL), Proton Therapy Accelerator in Adelaide.
 - Japan: See the next page for facilities. User fee for the operation ???

Germany, South America, Korea, India, etc. are missing.

Five Major Frontier Accelerators in Japan



B-Factory

1999–

Electron-Positron Collider

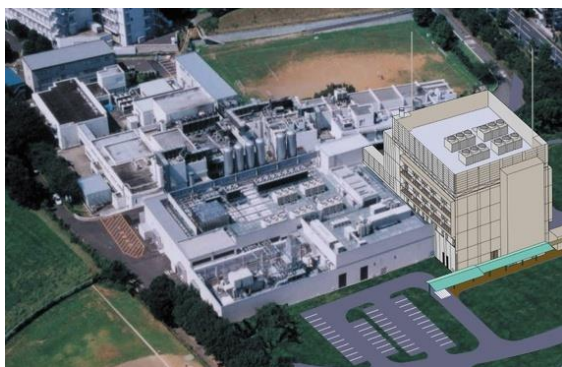
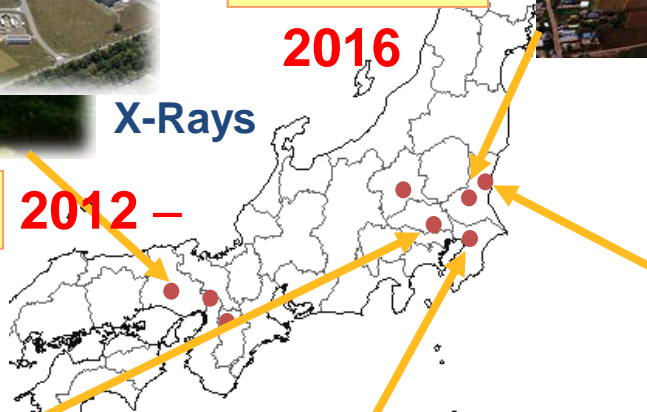
Super B

2016



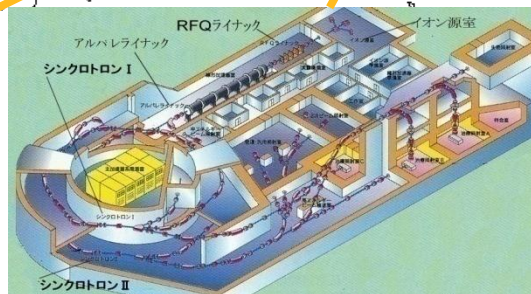
SPring-8 1997– **XFEL** 2012–

X-Rays



RI Beam Factory

2008 –
RI Beam



HIMAC 1994– **Heavy Ions**



J-PARC

2009–

Neutron + Muon, Kaons + Neutrinos

**Is there a role for the small scale
university nuclear science
laboratories (those mostly
without a users-community)?**

**→ Yes. These are the essential
training ground for young scientists.**

**Which is the better forum to
communicate the results of the
'in-Camera' meetings?**

**→ Briefing at the end of the WG9
Meeting ??????**

**Is a biennial sequence of the
Nuclear Science Symposia the more
appropriate one?**

→ Currently Yes.