Nuclear physics facility in China

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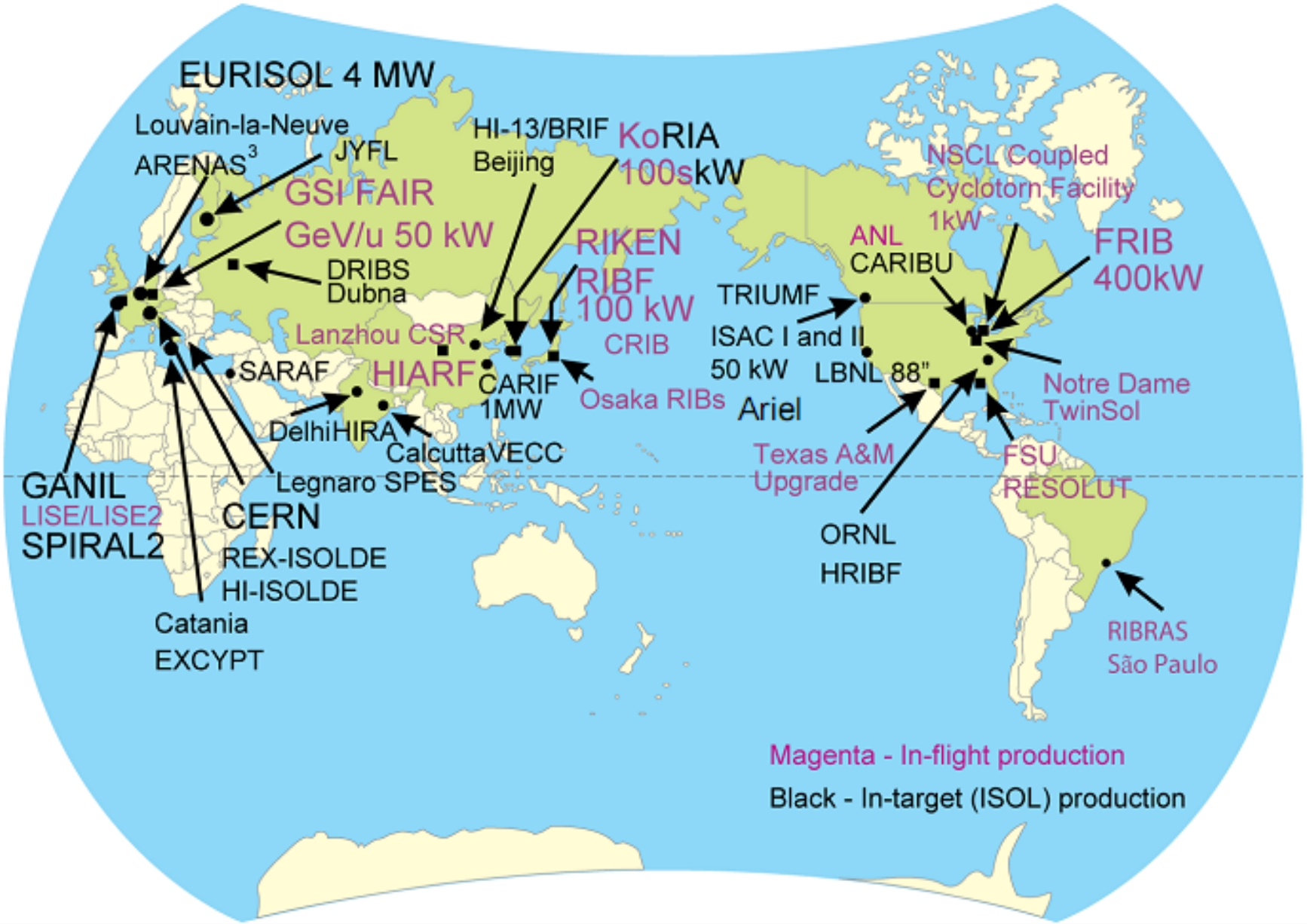
Contents

- Generals
- Current facilities, HI-13, CSR, CARR
- Research program
- Facility under construction, BRIF, SLEGS
- Other facilities
- Planed facilities, HIAF, Beijing ISOL
- Not included: BES, Daya bay, detector, theory, university facilities, etc

World wide RIB facilities



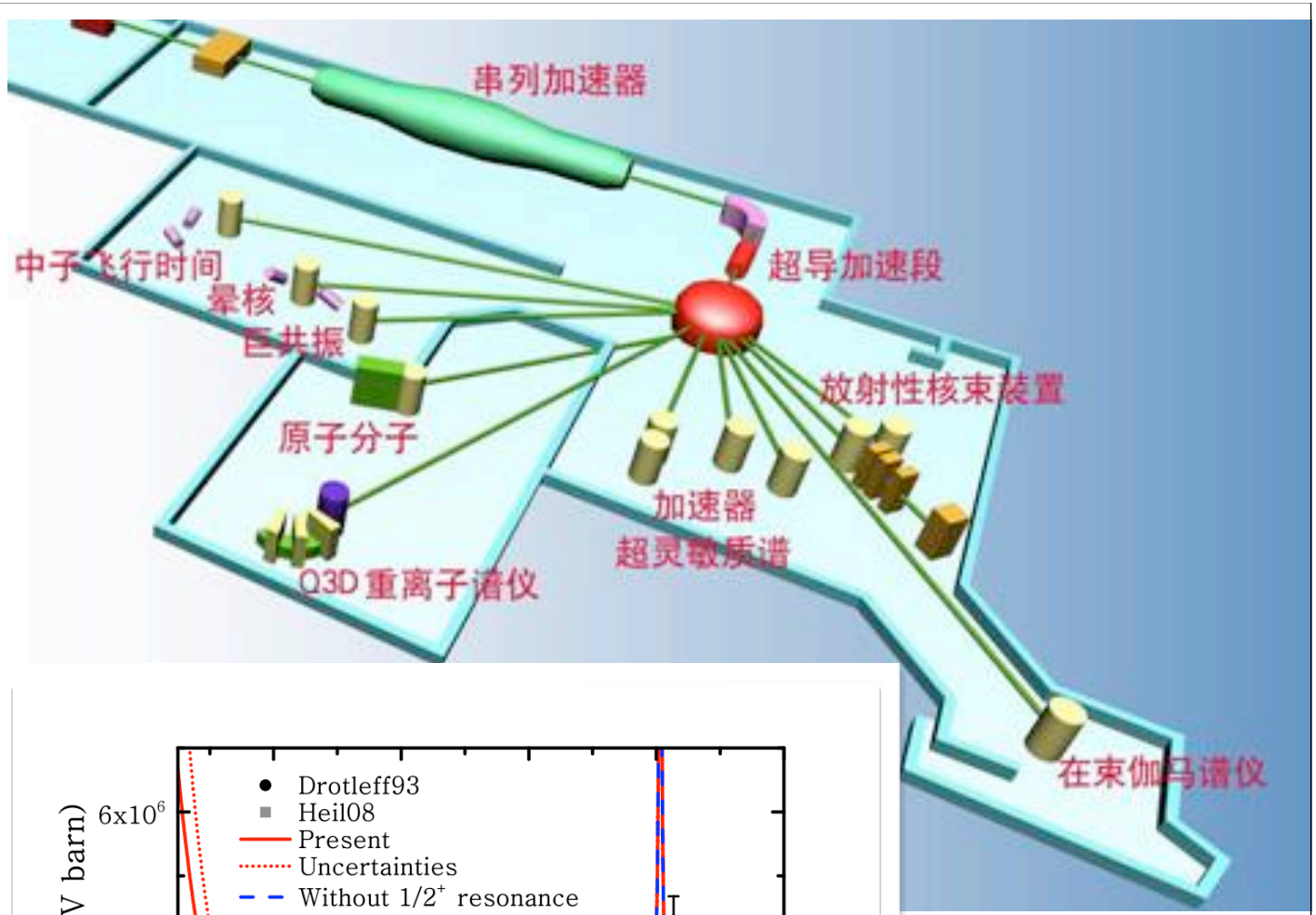
Facility map in China

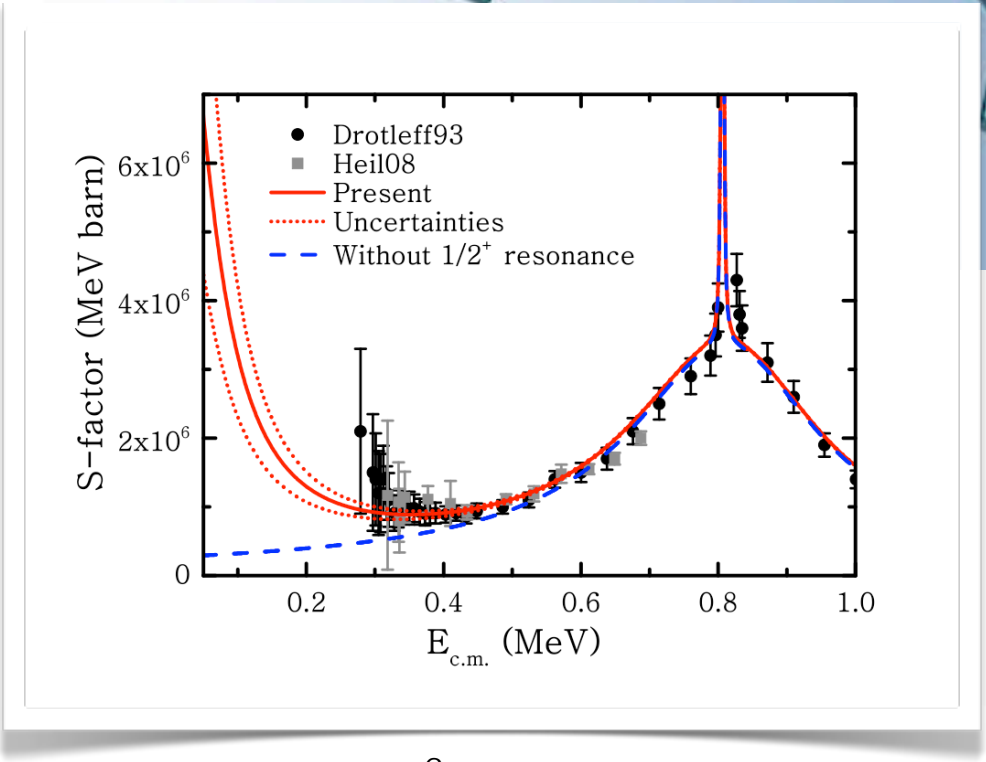
Generals

- Facilities, Beijing, Lanzhou, and more
- Many universities, PKU, etc
- Different government agencies, CAEA, CAS, MOST, MOE
- Joint efforts, 973 project, CNPS
- new 973: New physics and technology at the limits of nuclear stability, 2012-2016, headed by Y. L. Ye
- International collaborations, RIBF, CRIB, RCNP, DRAGON, ..., J-PARK, KORIA, LUNA, and ANU...?

HI-13

- As a national lab., 4000 hours/ a, research, application, data
- Reaction, structure, astrophysics
- Will upgrade by BRIF, post linac and separate cyclotrons

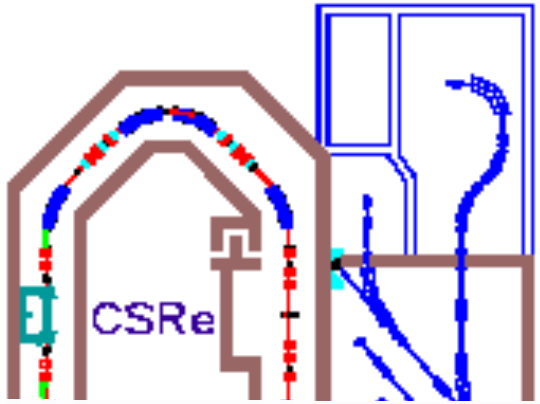




APJ, accepted
13C(α,n)16O

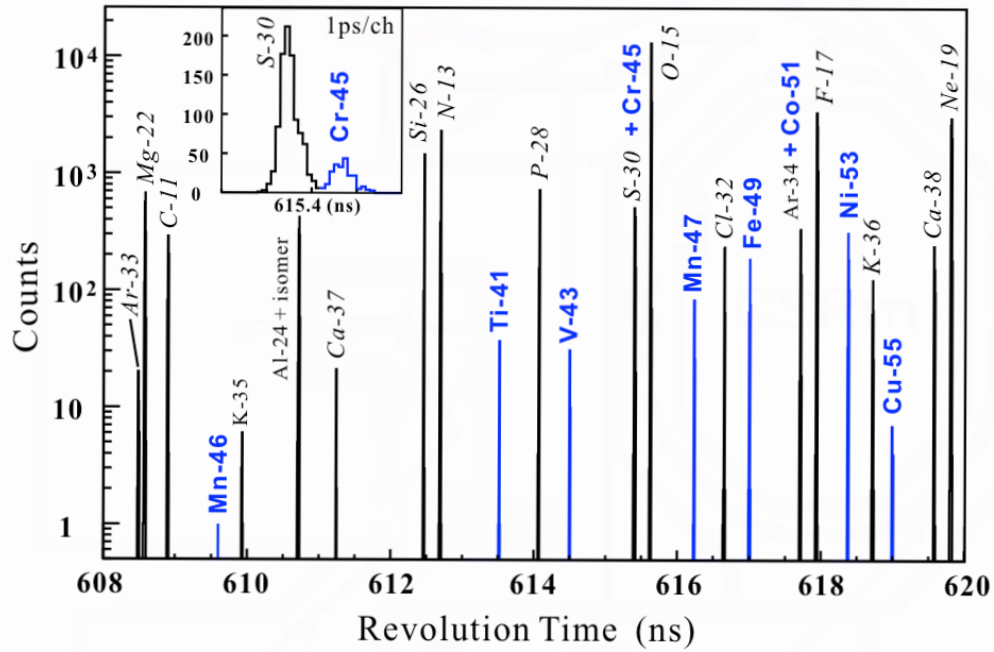
CSR

- High E HI, RIB, 2008
- Cyclotrons, synchrotrons
- Research, application, therapy
- RIB physics, mass, SHE
- RIB physics, reaction, decay, based on RIBLL



PRL, accepted

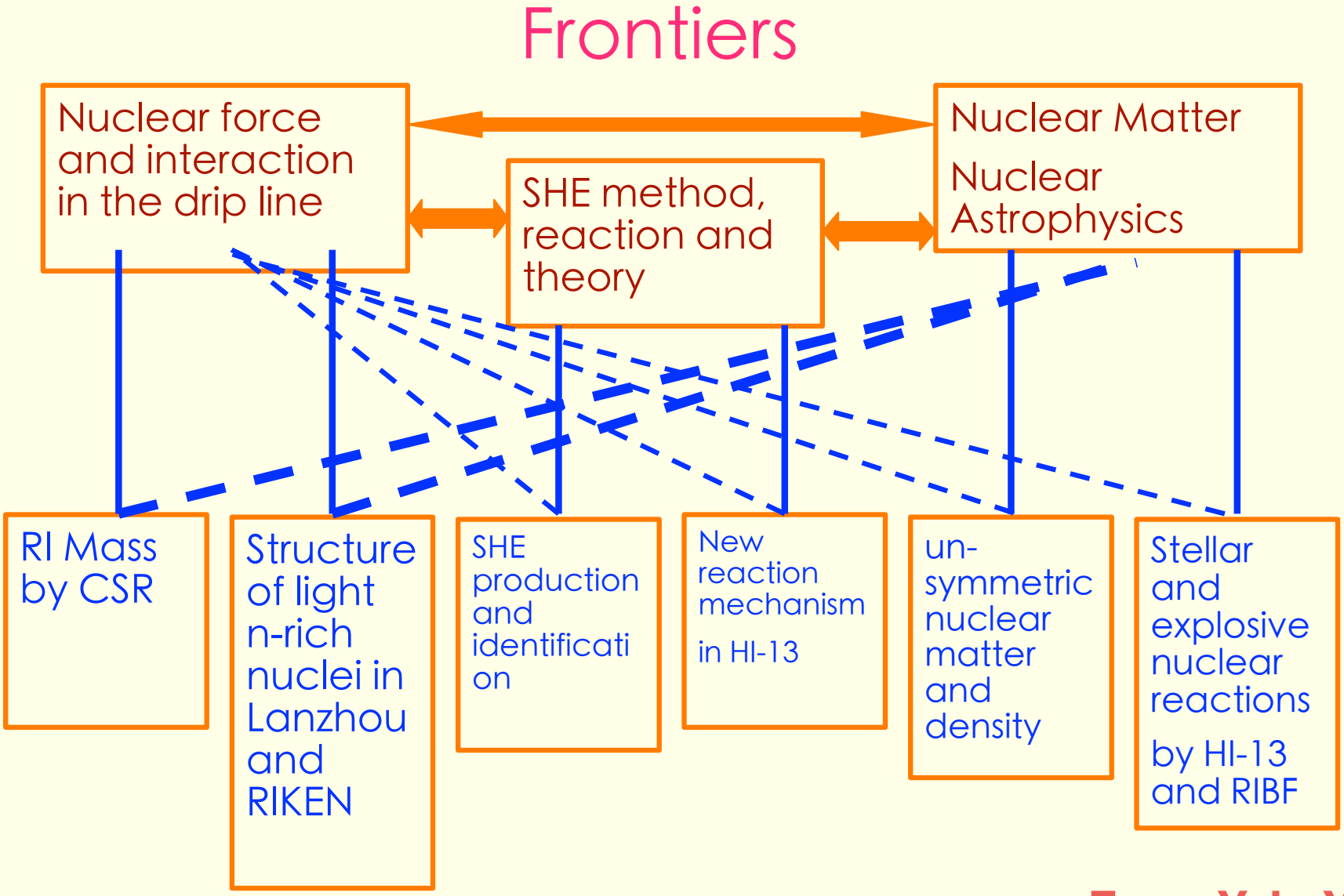
2



CARR

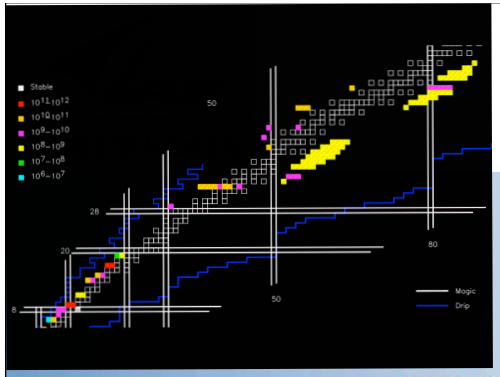
- 60MW, neutron flux 8×10^{14} n/cm^2·s
- Engineering started 2002
- First critical May 2010
- Reach full power May 2012

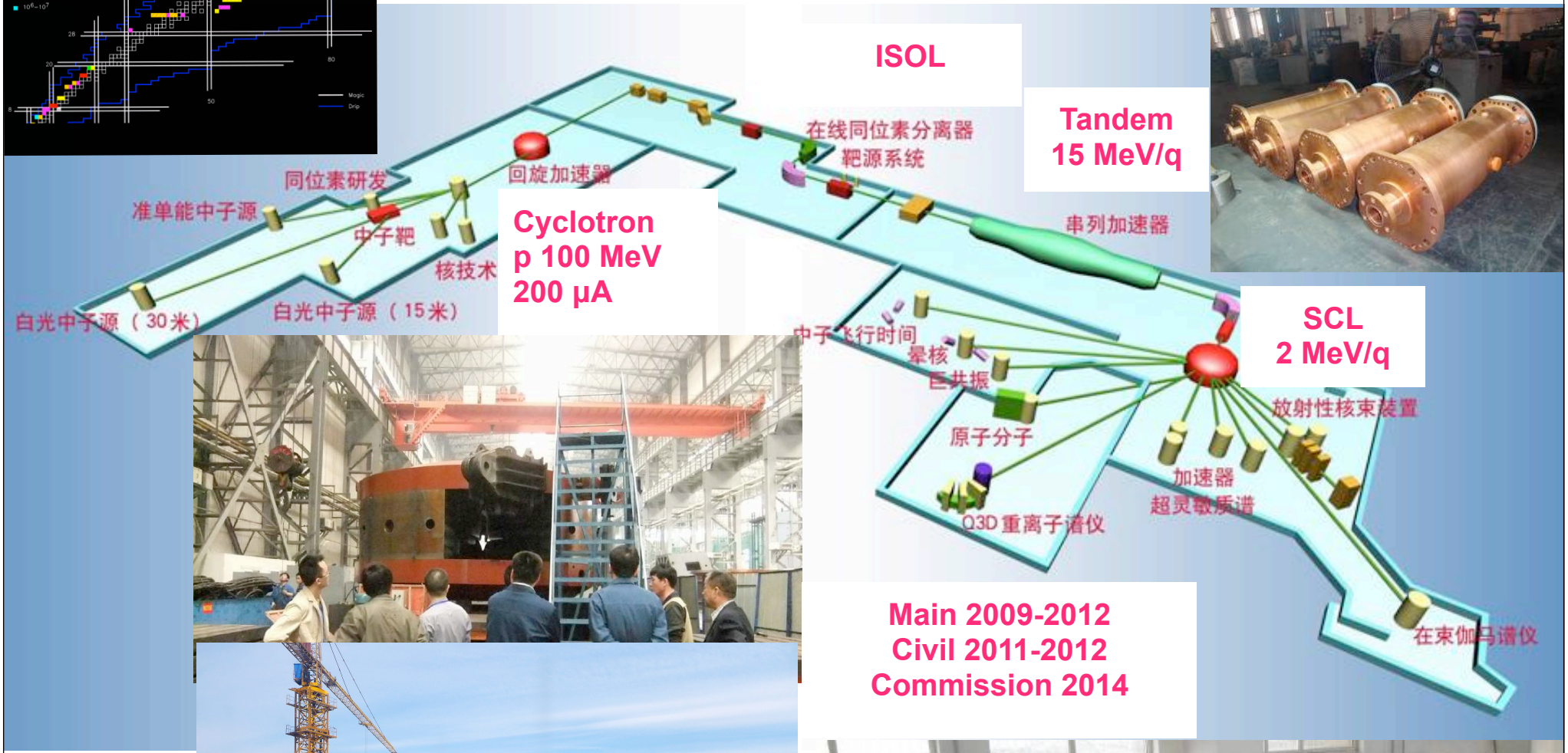
Research program by 973



From Y. L. Ye

BRIF progress



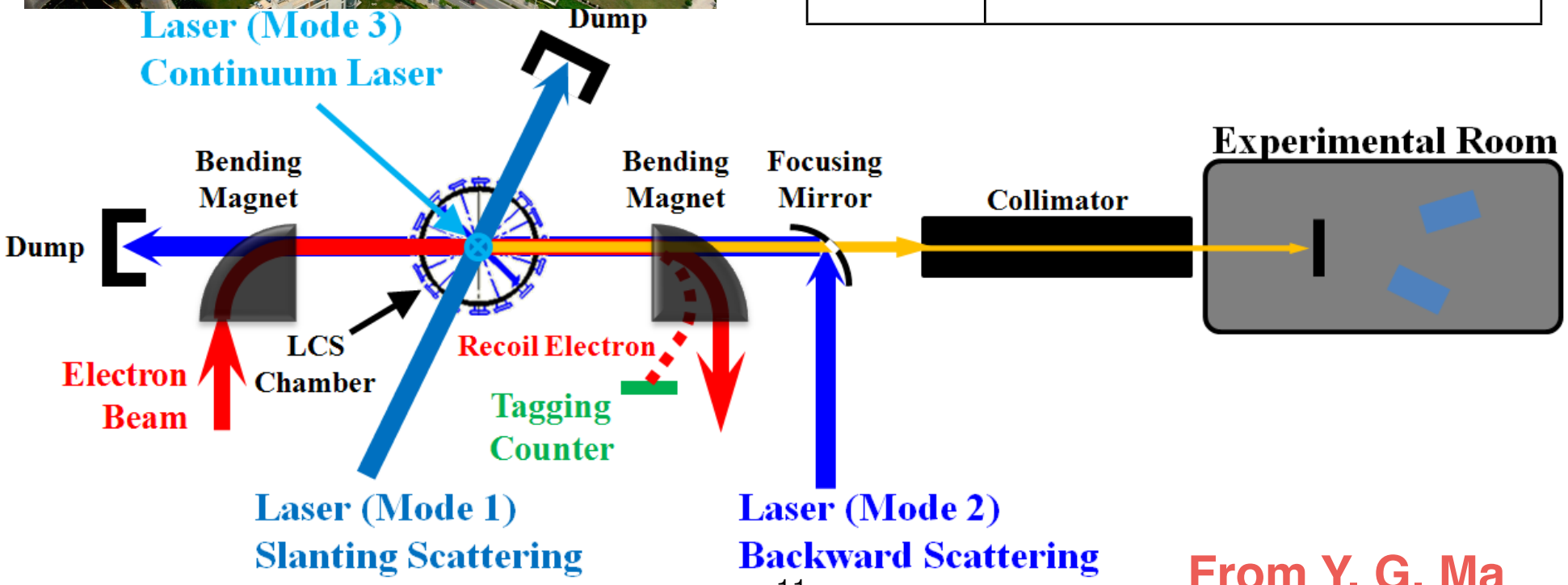


Main 2009-2012
Civil 2011-2012
Commission 2014

Shanghai Laser-Electron Gamma Source

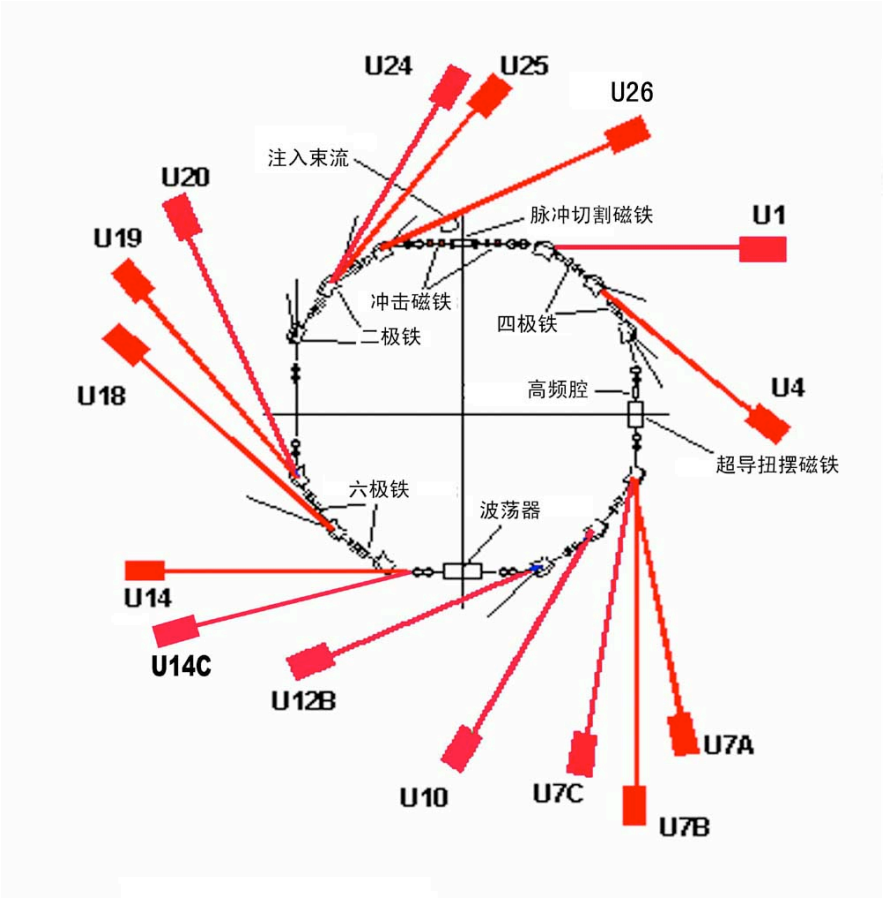
Phase II of Shanghai Synchrotron Radiation Facility: ~20 beams, one of them is SLEGS. It is expected the

γ flux	Low E：10^5-10^7 photons/s High E：6×10^6 photons/s
Gamma energy	Low E：2MeV－20MeV； High E：330MeV－550MeV；

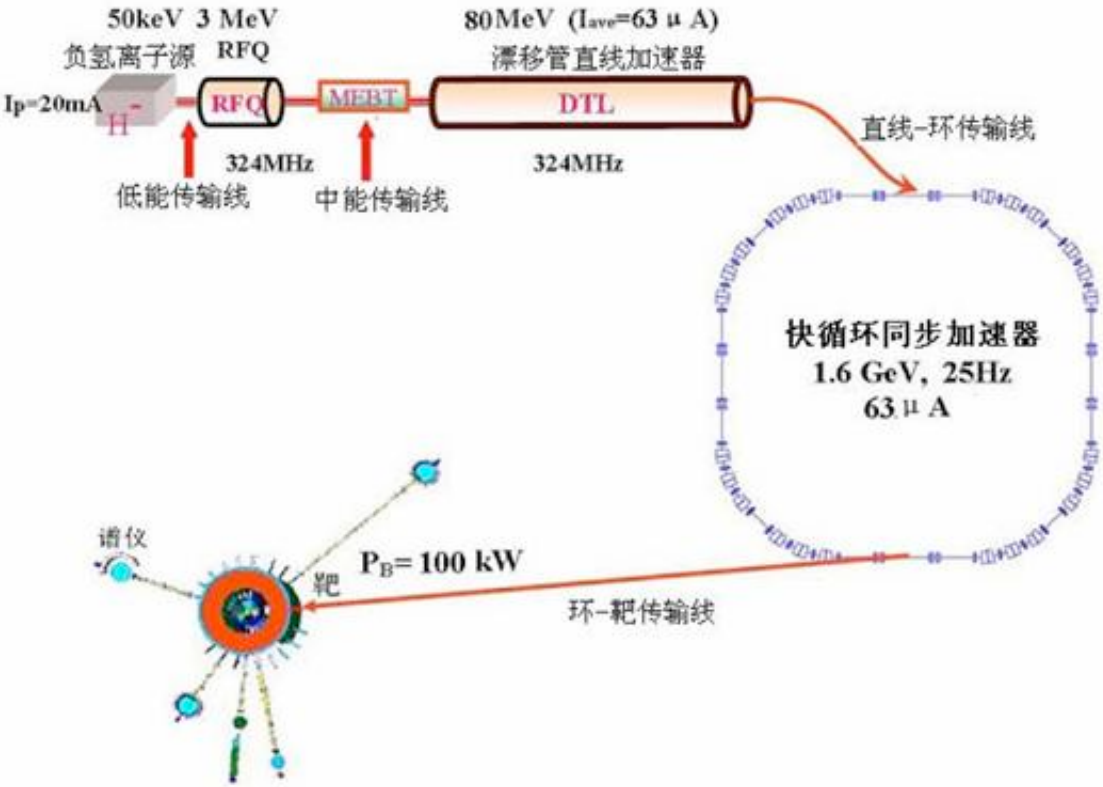


From Y. G. Ma

Other Facilities



NSRL
2004



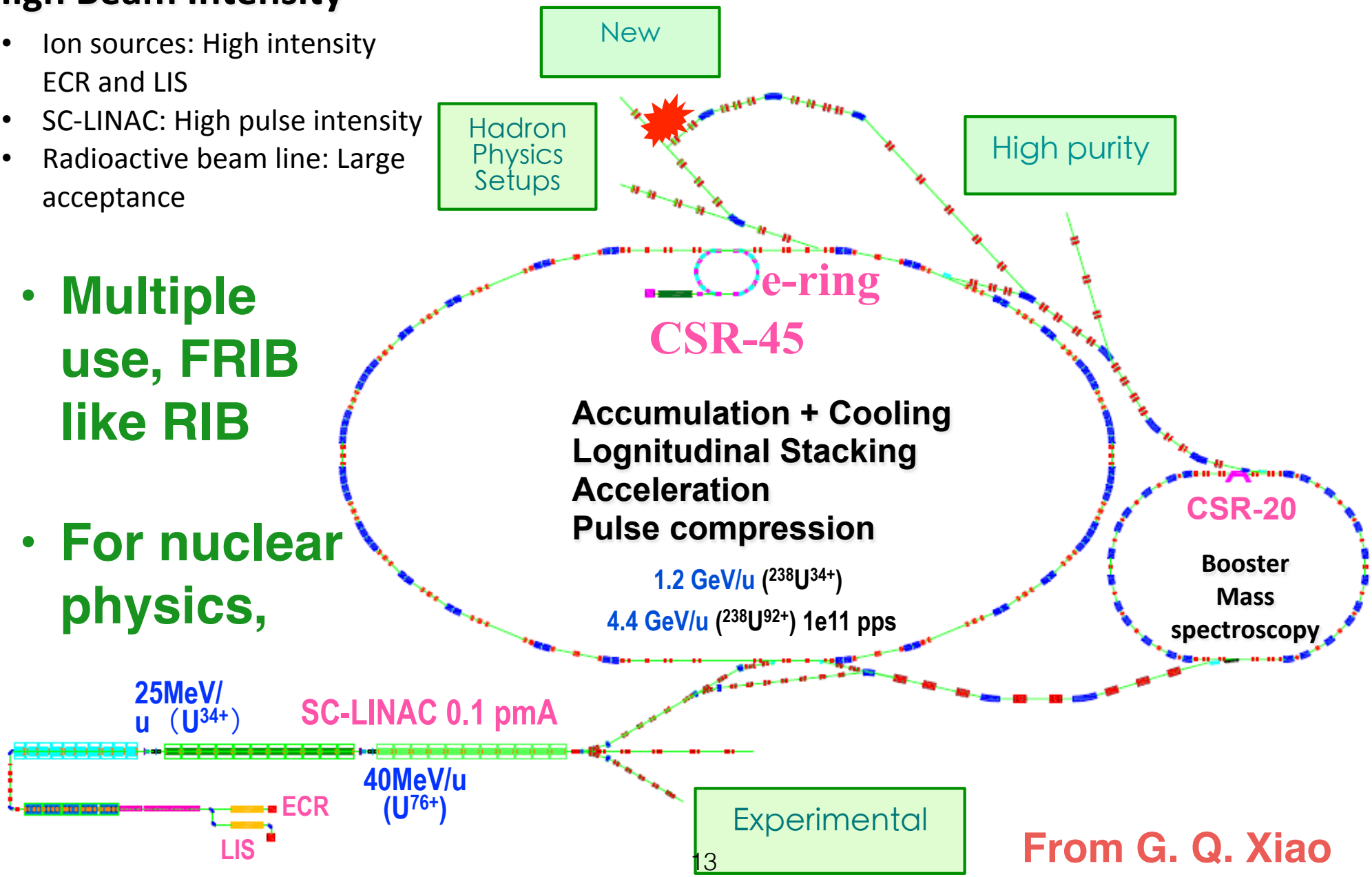
CSNS
construction
2017

HIAF

High Beam Intensity

- Ion sources: High intensity ECR and LIS
- SC-LINAC: High pulse intensity
- Radioactive beam line: Large acceptance

- **Multiple use, FRIB like RIB**
- **For nuclear physics,**

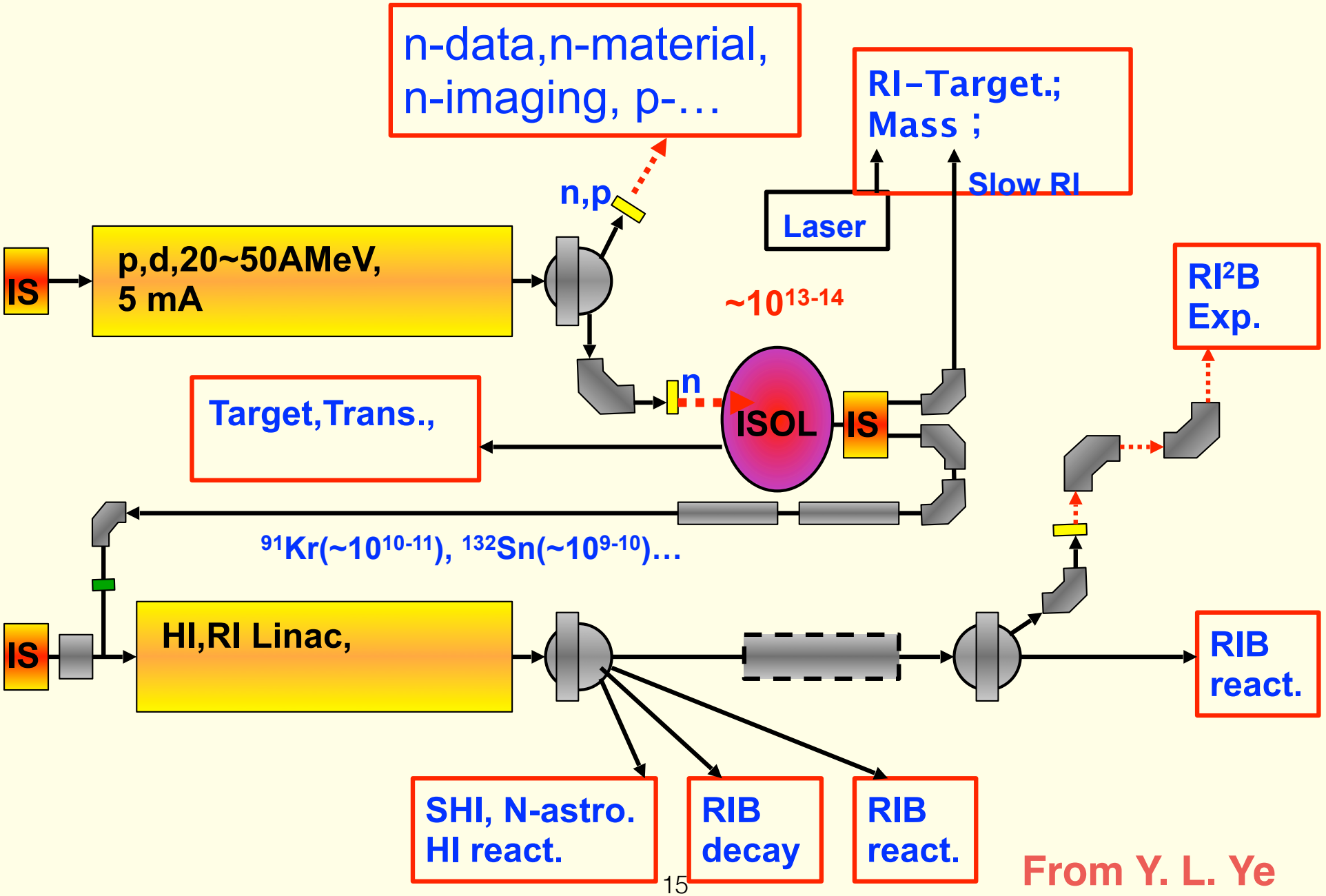


From G. Q. Xiao

Beijing ISOL

- Merge of CARIF(Reactor driven) in CIAE and ImPUF (e and light ion driven) in PKU
- Double driver, near CARR reactor, more independent and flexible
- Multi use, more user support
- University-Institute collaboration, MOU last Oct., enhance government support
- Domestic meeting Sep., IAC meeting Oct.: figure out basic design and name

ImPUF (Intense multi-beam multi-PUrpose Facility)



From Y. L. Ye

CARIF (China Advanced Rare Ion-beam Facility

Target/Ion source

Reactor

CARR

60 MW_t

5 g ^{235}U

ISOL

M/ΔM 1000

ECR

Atom Phys.

10 pμA

LINAC

Decay Spec.
Nucl. Data
Basic Sym.

Nucl. Astro.
SHE
RI reac. Sepc.

Cancer The.
Nucl. Matt. Irr.

^{132}Sn 5×10^{10} pps
^{91}Kr 4×10^{11} pps

LINAC

Production target

5 mg/cm^2 ^9Be

FRS

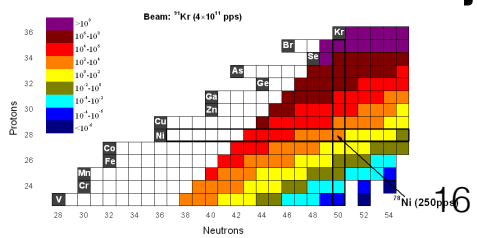
^{78}Ni >100 pps

Exp. Term.

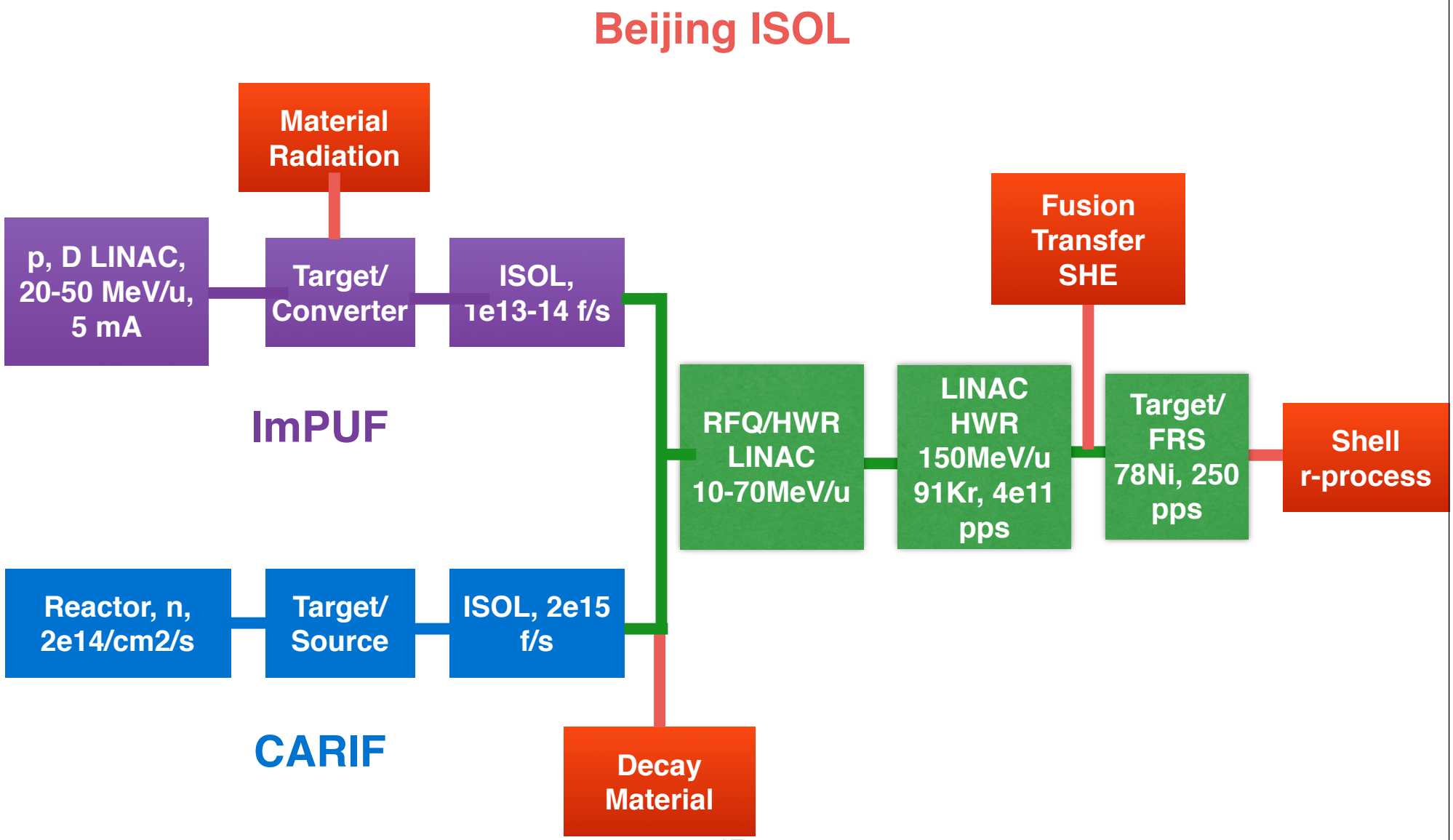
Drip line search
New magic No.

Unstable Data
Nucl. Effects

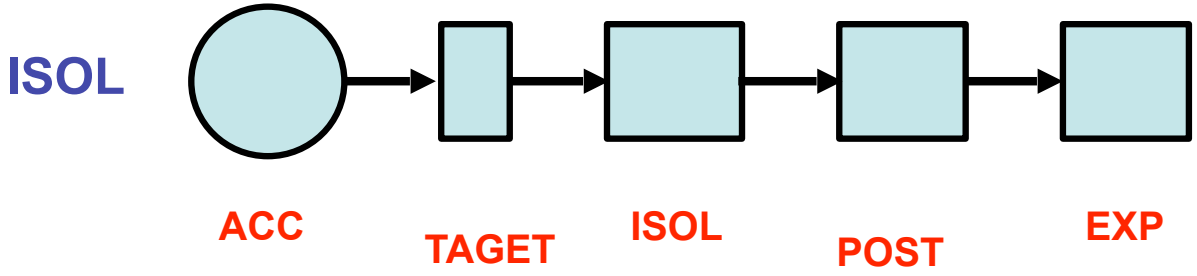
Explore neutron drip line
Extend application
Combine ISOL and PF
Using mature technology



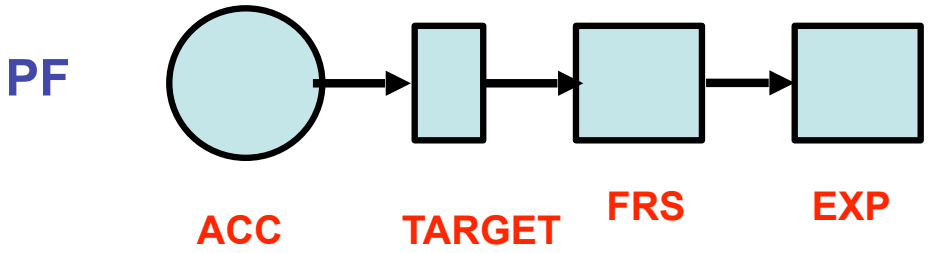
Merged project: Beijing ISOL



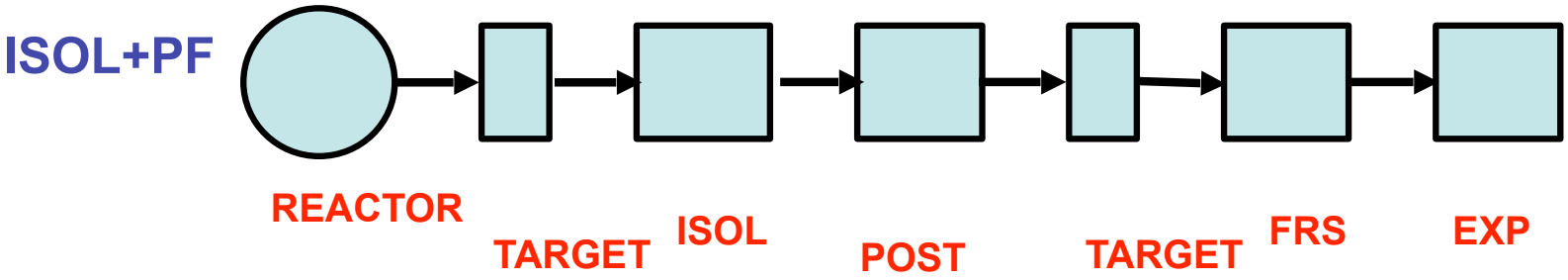
China Facility summary by production method



BRIF



CSR, HIAF



Beijing ISOL

Conclusion

- Nuclear communities are well organized and supported by existing facilities and funds, HI-13, CSR, 973, NSFC
- World level research work would be achieved if the new and proposed facilities commissioned, BRIF, SLEGS, HIAF, and Beijing ISOL
- ANPhA will be a good platform to exchange ideas on physics driven facilities idea, so they can complement and enhance each other
- Man power will be a problem for everywhere, so the more collaboration will be the importance solution