

Nuclear Physics

Present status & Future perspective

**Division of Nuclear Physics,
Korean Physical Society**

유병길 (항공대)

<http://home.icpr.or.kr/~kpsnuclear/>

Contents

- History and Status of Nuclear Physics Division
- Research areas
- KoRIA (RAON)
- Activities
 - Education/Training activities
 - Exchange Programs
- Supporting Institutions/Funding Agencies

History of KPS and DNP

- **1952. 12. 7 KPS founded.**
- 1967. 4.29 Particle Physics Division founded
- 1968. 4.25 Condensed Matter Division founded
- 1970. 4. Physics Education Division founded
- **1972. 4. 29 Nuclear Physics Division founded**
- 1972. 9. 7 The 20th Anniversary of KPS
- 1973. 4.27 Applied Physics Division & Statistical Physics Division
- 1981. 10. Plasma Physics Division and Optics Division
- 1982. 10.15 The 30th Anniversary of KPS
- 1992. 4. Atomic and Molecular Physics Division
- 1993. 4. Semiconductor Division
- 1995. 10. Astrophysics Division
- **2012. 4. KPS 60th Anniversary**

Nuclear Physics Division

1947: 윤세원, 이기억 서울대 물리학과 최초 학사

1948: 김희규 서울대 물리학과 졸업

1950: 김현창, 이동녕 서울대 물리학과 ,이철주 연세대 물리기상학과 졸업

1951: 김정흠 서울대 물리학과, 안세희 연세대 물리기상학과 졸업

1955: 이기억 물리학 전 분야에서는 4번째로, 핵물리학계에서는 첫 번째로 한국인 물리학 박사학위 취득. 한국인으로 처음 Physical Review에 핵물리 논문을 발표

1972. 4. 29 Nuclear Physics Division founded

2012: 핵물리 분과 40 주년, 한국 중이온 가속기 (라온=RAON) 건설

역대 분과위원장

1972 - 1973	안세희 (연세대)
1973 - 1975	김정흠(고려대)
1976 - 1977	김현창(성균관대)
1978 - 1980	문국진(한양대)
1980 - 1984	고윤석(서울대)
1984. 10 - 1986. 10	전일동(연세대)
1986. 10 - 1989. 10	김종찬(서울대)
1989. 10 - 1991. 10	심광숙(고려대)
1991. 10 - 1993. 10	민동필(서울대)
1993. 10 - 1995. 10	정운혁(부산대)
1995. 10 - 1997. 10	방형찬(서울대)
1997. 10 - 2001. 10	신승애(이화여대)
2001. 10 - 2002. 1	이대원(부산대)
2002. 4 - 2004. 4.	이춘식(중앙대)
2004. 4. - 2006. 4.	이강석(전남대)
2006. 4. - 2008. 4.	김우영(경북대)
2008. 4. - 2010. 4	박병윤(충남대)
2010. 4. - 2012.4	홍승우(성균관대)
2012.4 - 2014.4	유병길(항공대)

Status of Members: ~ 250 members

• Regular Members and Fellows (정회원, 평의원)	~ 170
• Student Members (학생회원)	~ 70
• Steering Committee Members (운영위원)	12
1. Korea-Japan Exchange Program Committee (한-일 교류 위원회)	3
2. Nuclear Physics School Committee (핵물리학교 위원회)	3
3. Scientific Program Committee (학술위원회)	8

Research Groups

Low Energy & Applications	~ 150 members Theory, Nuclear Structure & Reactions, Nuclear-astrophysics, Applications (Detector Development, Data, Imaging)
High Energy Heavy Ions (HIM)	~ 50 members Theory, Exp. RHIC, GSI, CERN
Hadron Physics	~ 50 members Theory, Exp. JLab, J-PARC

Nuclear Physics Research

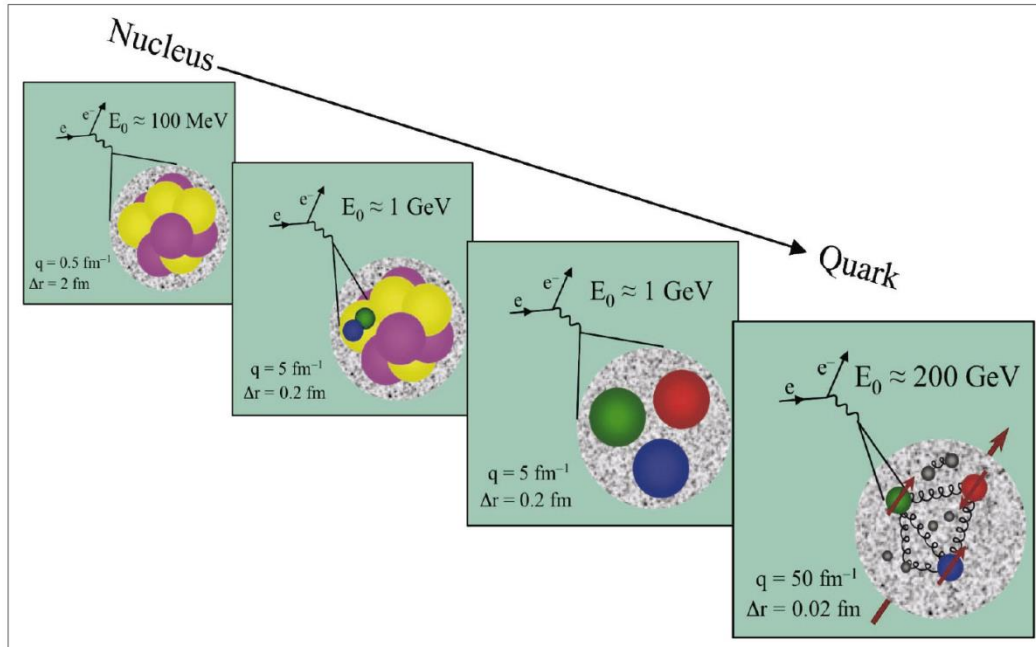


Figure 2. Different projectile energies test different properties of the nucleon structure.

Hadron Physics (HaPHy)

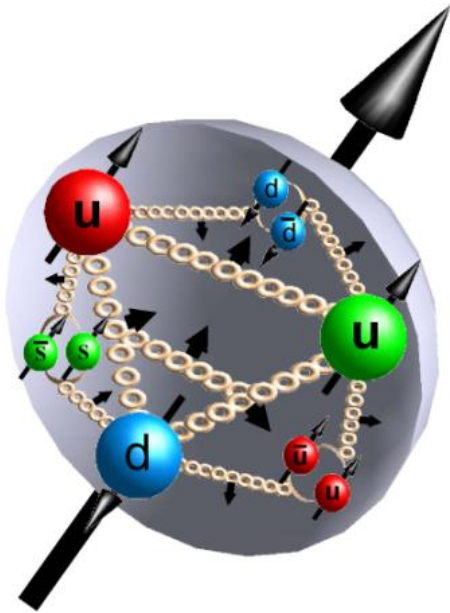
Nuclear structure & reaction

Nuclear Astro physics

Heavy Ion Collision (HIM)

Application (User group)

HaPhy



Happy HaPhy!

Search this site

The Korean Hadron/Few-Body Physics Working Group

Home

Who We Are

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393

days since
The first hadron physics meeting

Related Sites

Heavy Ion Meeting



2012: Hadron Physics from Nuclei to Stellar Phenomena

2011: From MeV to TeV



2012년의 첫 HaPhy 모임인 HaPhy2012-04가 Theories for J-PARC Physics 라는 주제로 4월 14일 (토) 포함의 아시아 태평양 이론물리센터에서 5분의 국외 연사와 2 분의 국내연사를 모시고 모두 49 분이 참석한 가운데 열렸습니다. 특히 이번 행사는 APCTP-WCU(Hanyang) Focus Program, Heavy Ion Meeting과 공동으로 열려 많은 분들이 참석하여 유익한 행사가 되었습니다. 이날 행사의 프로그램은 다음과 같습니다.


주제: Theories for J-PARC Physics
일시: 2012년 4월 14일(토)
장소: APCTP Headquarters, Pohang
후원: APCTP

HIM

Heavy Ion Meeting

<http://him.phys.pusan.ac.kr/~him>

contact us : tdw1978@pusan.ac.kr / tel) 051-513-2594 / fax) 051-512-2594

sponsored by 



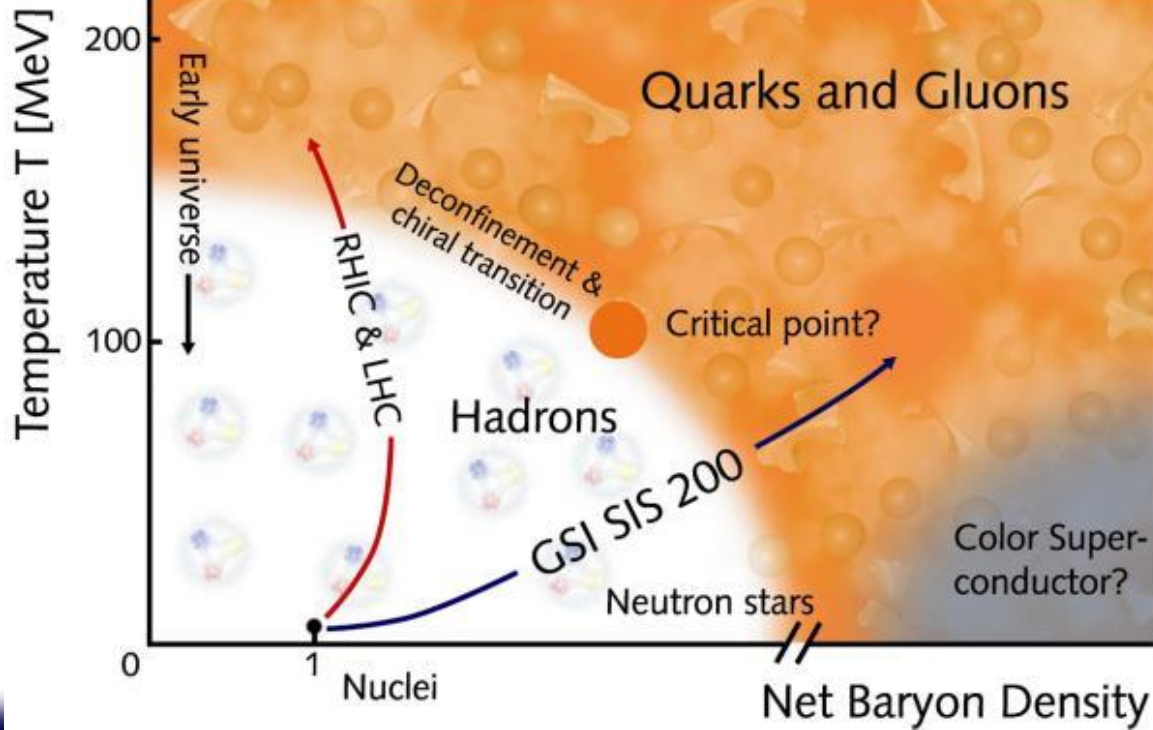
HIM 소개

HIM 모듬

- HIM 2010
- HIM 2009
- HIM 2008
- HIM 2007
- HIM 2006
- HIM 2005

Heavy Ion Meeting 2012-04

- Date : April 13 (Fri.), 2012.
- Location : APCTP Headquarters, Pohang, Korea, Korea
- Title : Nuclear Equation of State and Symmetry Energy
- Organizing Committee :
 - Byungsik Hong (Korea University)
 - Su Houg Lee (Yonsei University)



of State and Symmetry Energy"의 주제, APCTP-WCU 포커스 프로그램 stars in QCD and hQCD) 및 하드론물리(HaPhy) 그룹과 공동으로 개최함

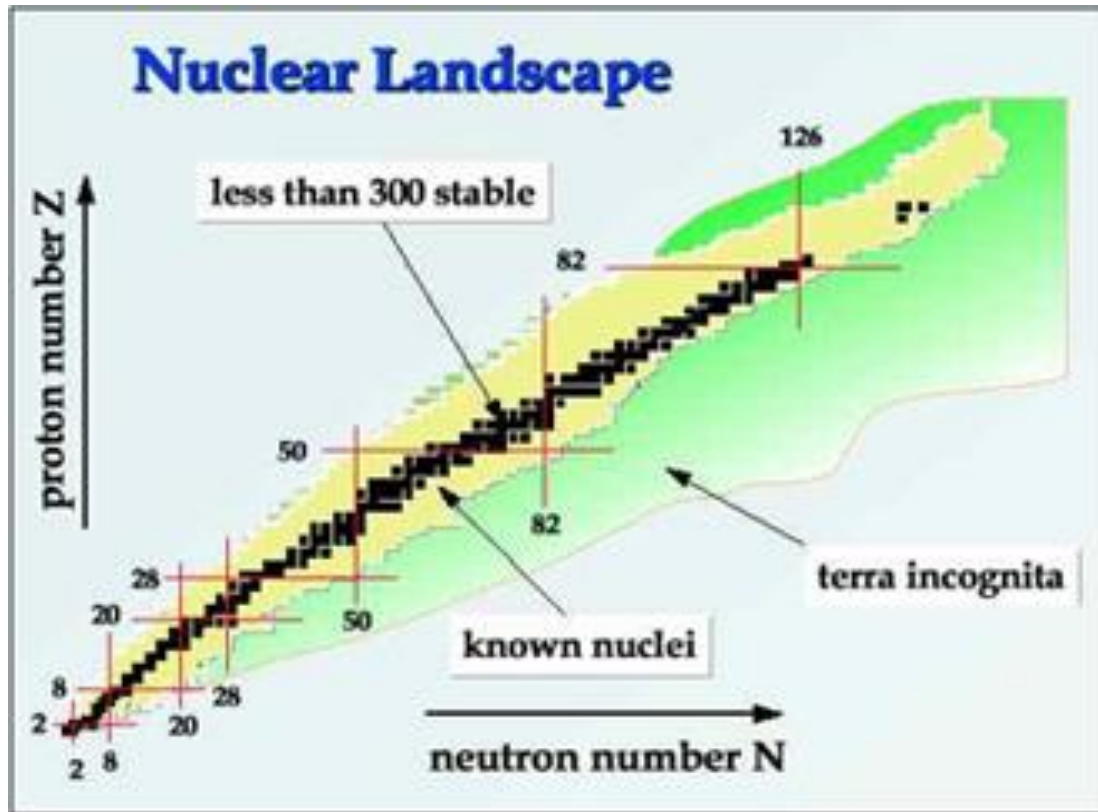
이용한 중이온 가속기 실험이 우리나라를 비롯한 세계 각국에서 건설 핵의 상태방정식 및 대칭에너지 관련 연구가 활성화되고 있습니다. 따라서 포커스 프로그램 초청 연사 중 관련 분야의 전문가인 Hermann Wolter, tz 교수님을 초청하여 대칭에너지 이론과 실험에 대한 논의를 심도

수님이 한국형 중이온 가속기에서의 대칭에너지 실험계획 발표하 D할 규칙에 의한 대칭에너지 연구결과를 발표할 예정입니다.

Nuclear Physics Aims

- How to describe the rich variety of low energy structure & reactions of nuclei in terms of the fundamental interactions between individual particles?
- How to predict the evolution of the nuclear collective & single-particle properties as functions of mass, isospin, ang.-mom. and temperature?
- How to find regular & simple patterns emerge in the structure of complex nuclei?
- What are the key variables governing the dynamics between colliding composite systems of nucleons?

Nuclear chart



Issues in nuclei from light to heavy elements

- Explore the region "terra incognita"
- Symmetries & phase transition, etc
- Toward a unified description

Nuclear Physics

● Nuclear Structure and Reactions

- Ab initio method (EFT) : light nuclei
- Shell structure : between EFT & EDF
- Nucl. Energy density functional method (EDF) : heavy nuclei
- Collective mode

● Nuclear Astrophysics

- From nuclei to stars at specific conditions : neutron stars, supernova, etc
- Nucleosynthesis : HCNO cycle, r-process, rp-process

Nuclear Astro Physics

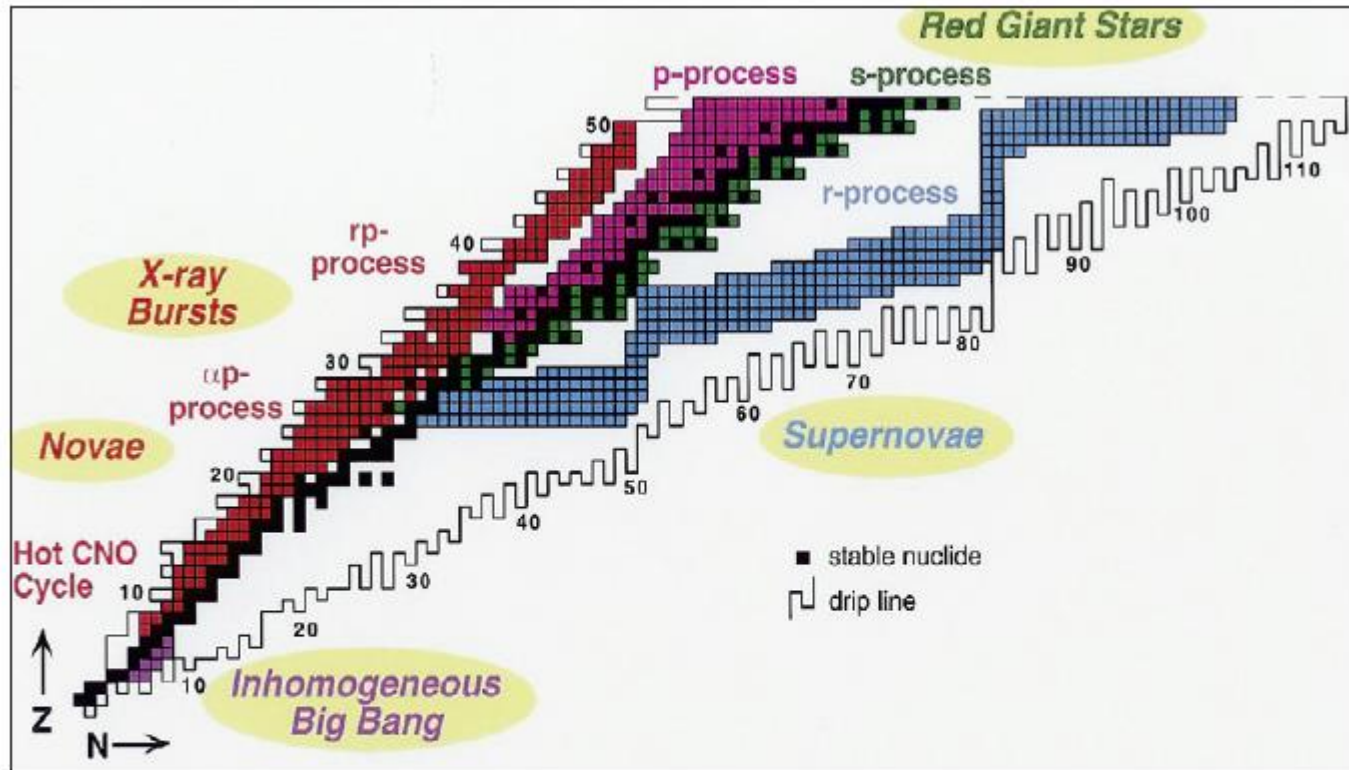


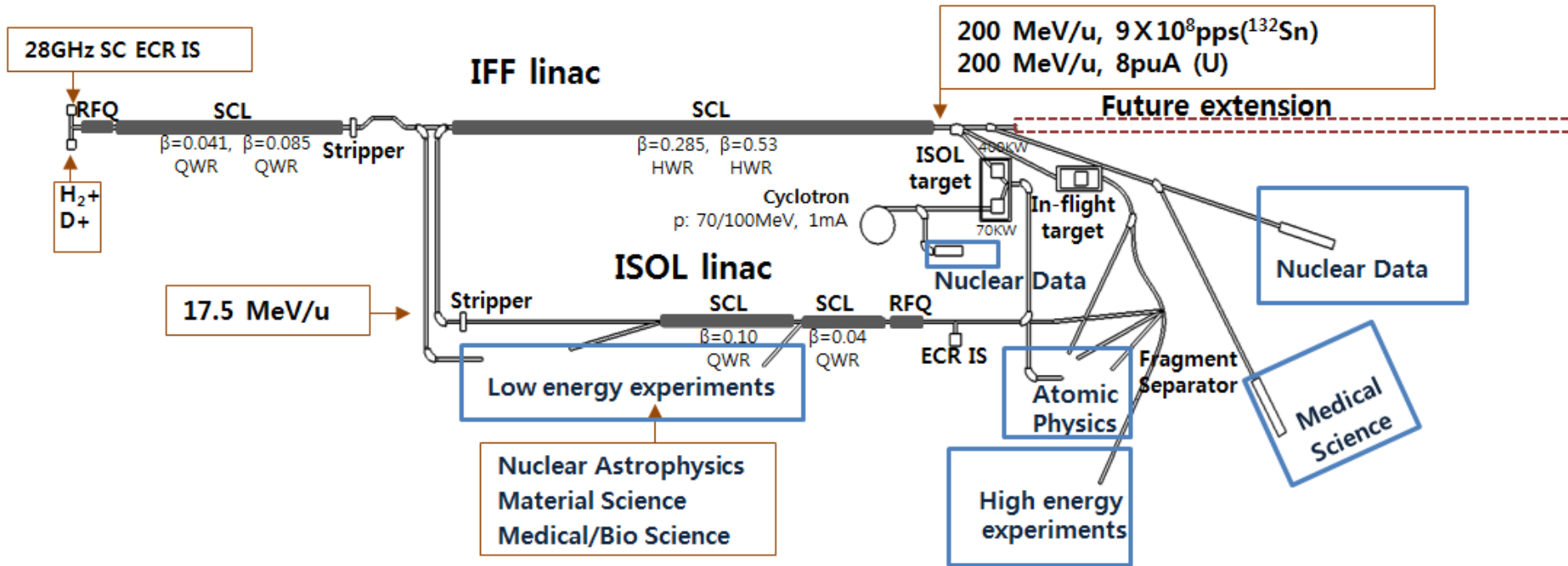
Figure 7. This figure from a review by Smith and Rehm (Ann. Rev. Nucl. Part. Sci. 51(2001)130) illustrates how nuclear astrophysics modelling requires theoretical information is across the chart of nuclei.

Taken from NuPECC long range plan 2010

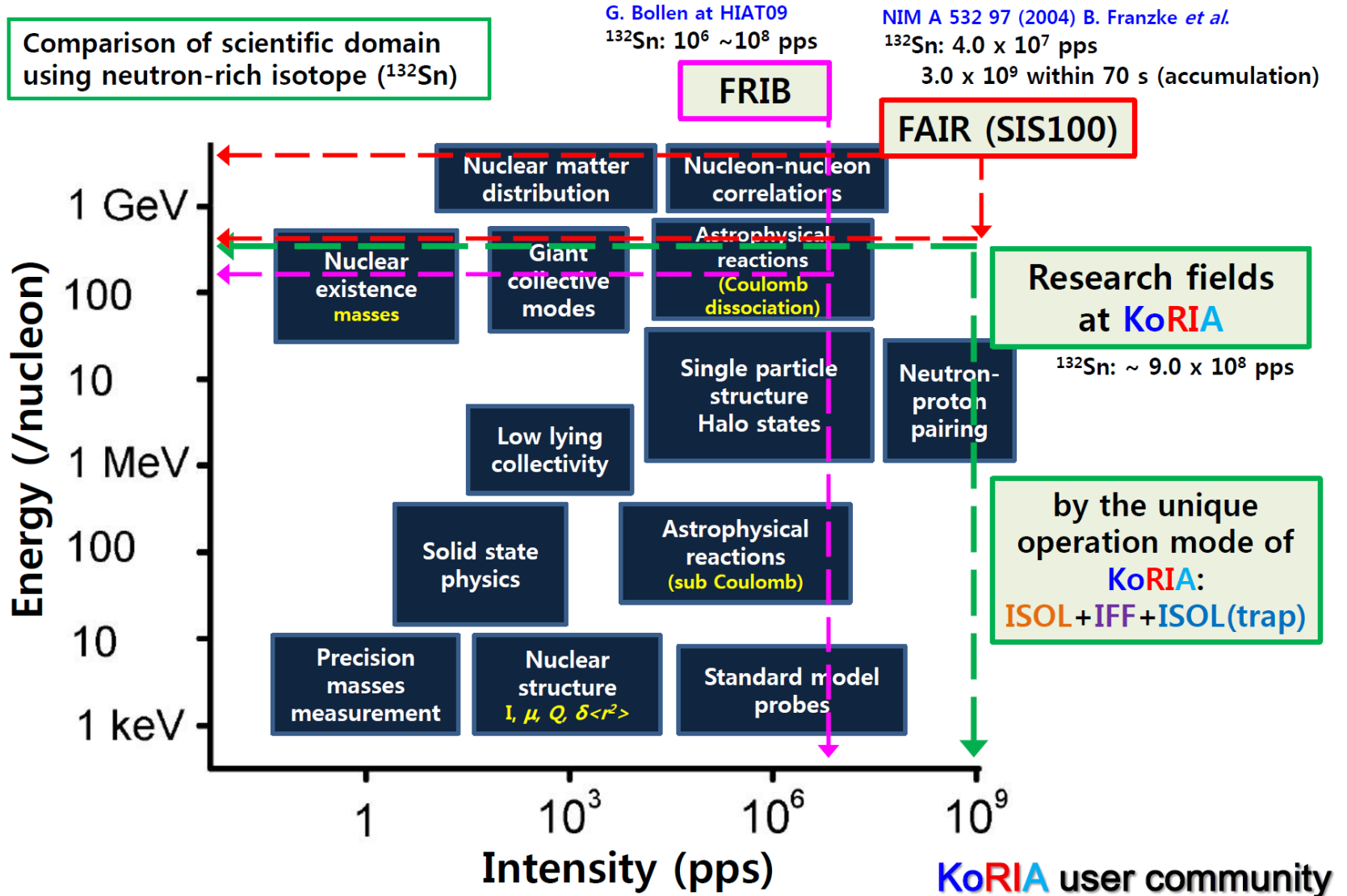
KoRIA : Korea Rare Isotope Accelerator (RAON)



Layout



Performance



Purpose

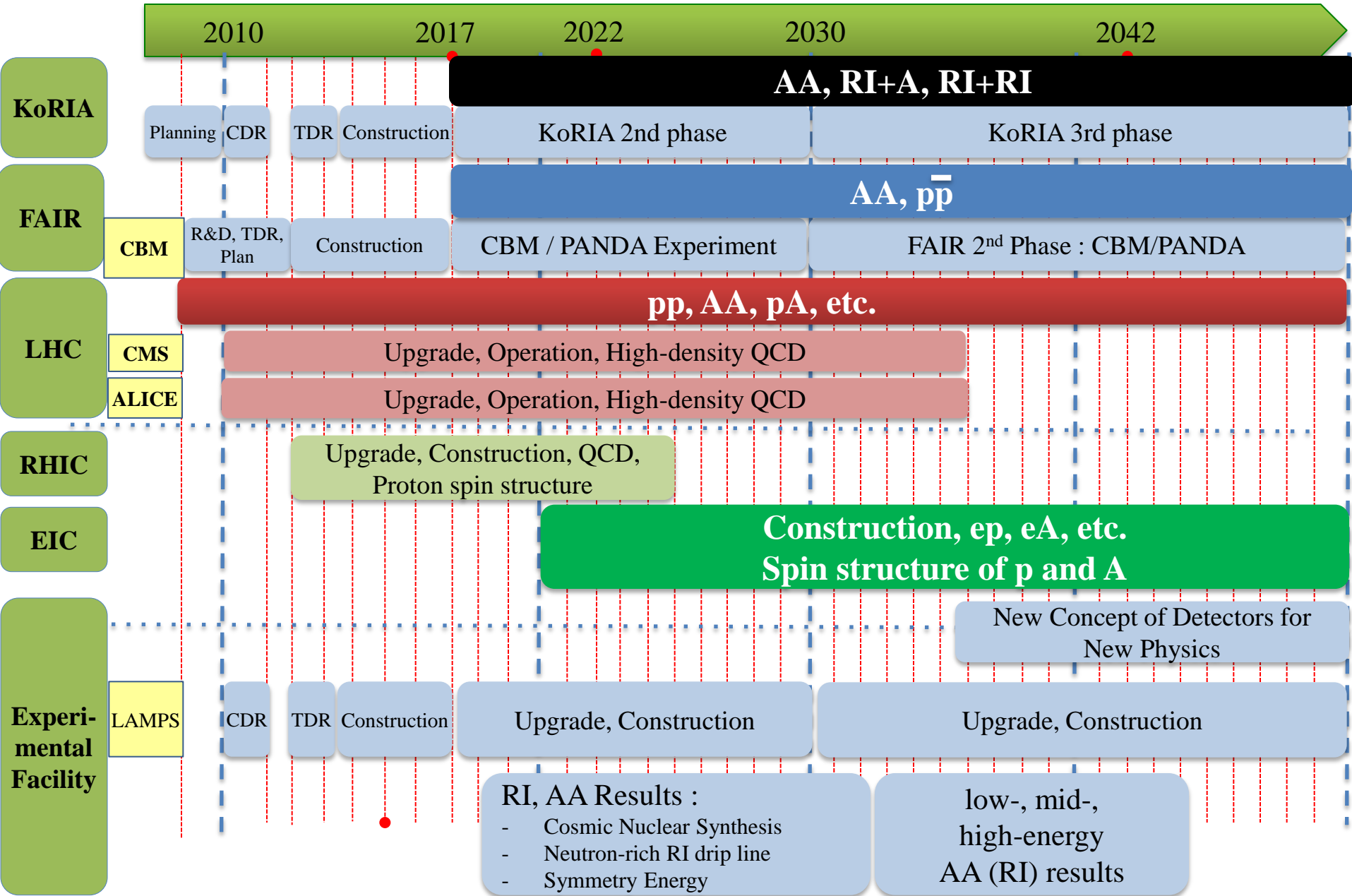
기초 연구

우주원소지도 완성
중성자과잉 RI 연구
새로운 기본 원소 발견
우주/별의 진화과정
핵의 대칭에너지
원자포획 이용 RI 연구
핵자료 구축

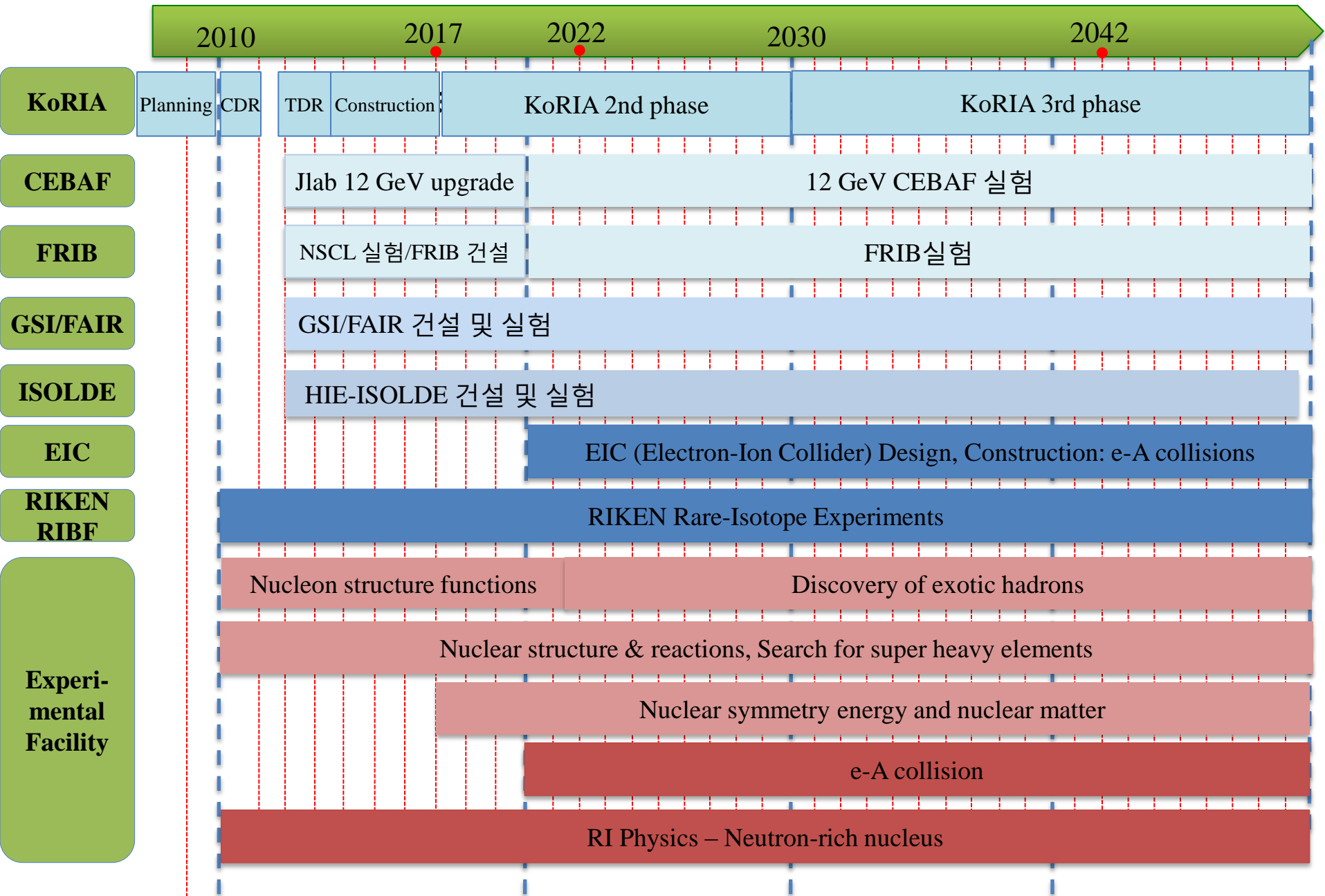
응용 연구

첨단 암치료 기술 개발
생명과학/DNA 구조
초미세 구조
나노 물성
신소재 반도체 개발
신소재 초전도체
방사성폐기물처리기술

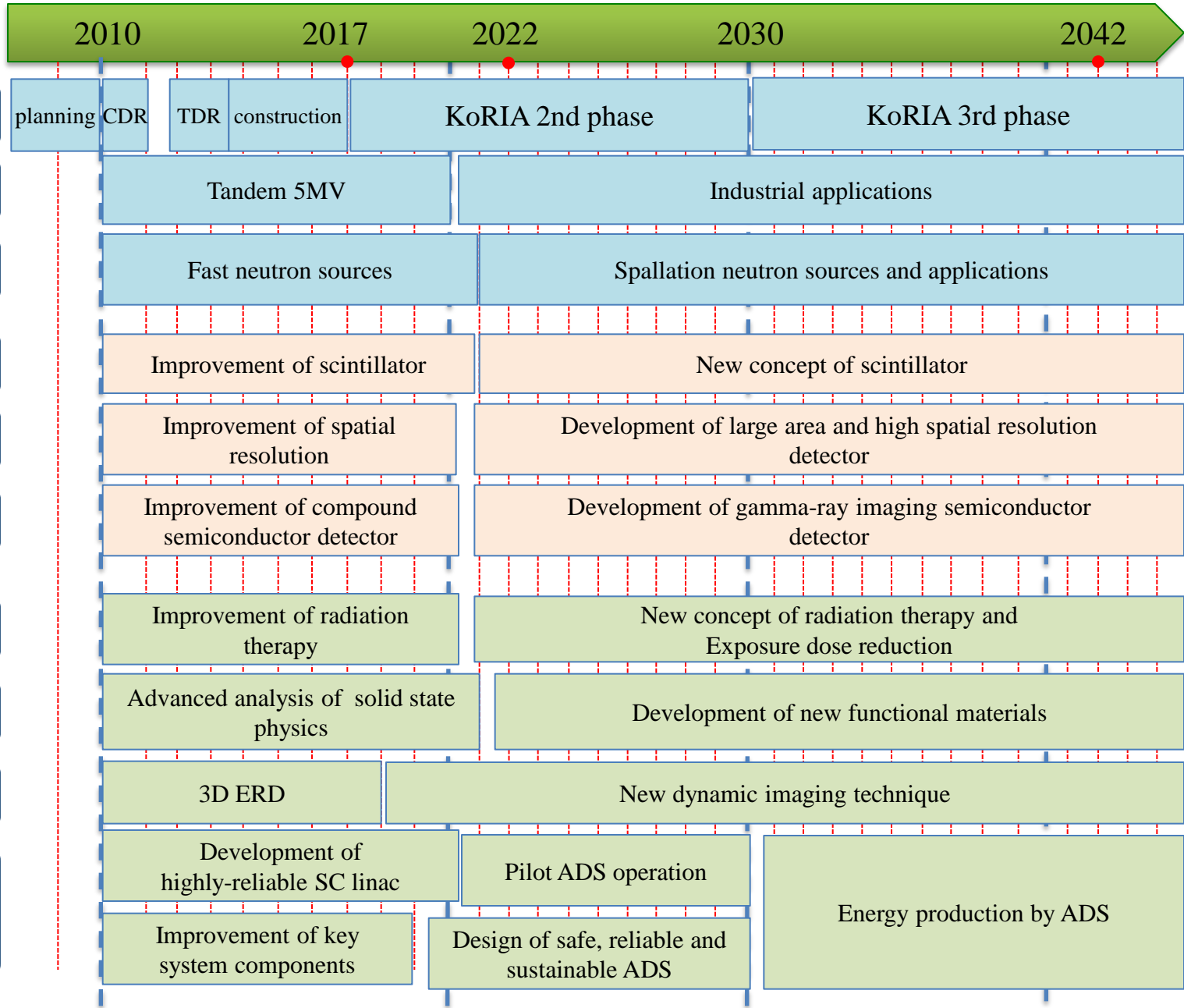
고에너지 핵물리학



저에너지 핵물리학 및 강입자물리학



응용핵물리학



Nuclear Summer School and Symposium (NuSS)

Organized by Prof. Dong-Pil Min for more than 10 years

Name	Topics	Date	Participants	Place
NuSS'88	Selected Topics in Nuclear Physics	1988. 8. 16-20	63	설악산
NuSS'89	Intermediate Energy Nuclear Physics	1989. 6. 26- 7. 1.	58	경주
NuSS'90	Selected Topics in Nuclear Physics	1990. 8. 8-23	48	서울
NuSS'91	High Density and High Temperature Physics	1991.. 7. 1-6	47	남원
NuSS'92	Nuclear Physics with Strangeness	1992. 6. 29- 7. 4	56	서울
NuSS'93	Astro-Nuclear Physics and Related Topics	1993. 8. 20-25	38	무주
NuSS'94	Low Energy Effective Theories and QCD	1994. 6. 27 - 7. 2	42	서울
NuSS'95	Intermediate Energy Nuclear Physics and Chiral Theory	1995. 7. 17-21	31	제주
NuSS'96	Nuclear-Astro Physics and Nuclear Star	1996. 8. 19-23	34	광주
NuSS'97	QCD, Lightcone Physics and Hadron Phenomenology	1997. 7. 17-21	76	서울
NuSS'98	Effective Theories of Matter	1998. 6. 23-26	67	서울
NuSS'99	New Directions In Quantun Chromodynamics	1999. 5. 26- 6. 18	74	경주
NuSS'00	Some Topics on Dense Matter	2000. 6. 22-24		부산

Nuclear Physics School

Organized by the Division of Nuclear Physics

	Date	Place	Committee Members	Participants
1회	2003. 1. 6. ~ 1. 11.	KAERI	김용균 (원자력연구소, 워크숍 조직위원장) 이춘식 (중앙대, 핵물리분과위원장) 홍승우 (성균관대, 핵물리학교 조직위원장)	49
2회	2004. 7. 4. ~ 7. 9.	Pusan National U	홍승우(성균관대, 핵물리학교 조직위원장) 이강석(전남대, 핵물리분과위원장)	34
3회	2005. 6. 27. ~ 7. 2.	SKKU	홍승우(성균관대, 핵물리학교 조직위원장) 이강석(전남대, 핵물리학분과위원장)	39
4회	2006. 6. 26. ~ 6. 30	Yonsei University	이수형(연세대, 핵물리학교 조직위원장) 김우영(경북대, 핵물리학분과위원장)	
5회	2007. 6. 25. ~ 6. 29.	APCTP	이수형(연세대, 핵물리학교 조직위원장) 김우영(경북대, 핵물리학 분과위원장)	36
6회	2008. 6. 30. ~ 7. 4.	Korea Univ	홍병식(고려대, 핵물리학교 조직위원장) 박병윤(충남대, 핵물리학 분과위원장)	
7회	2009. 6. 29. ~ 7. 3.	APCTP	김현철(인하대, 핵물리학교 조직위원장) 박병윤(충남대, 핵물리분과위원장)	
8회	2010년 6. 28. ~ 7. 2.	APCTP	김용균(한양대, 핵물리학교 조직위원장) 홍승우(성균관대, 핵물리분과위원장)	



Korea-Japan Exchange Programs

Date	Place	참가자
1998. 4. 24 ~ 4. 25	KPS Meeting at Korea Univ.	M. Fujiwara (RCNP. Osaka Univ.) , A. Ozawa (RIKEN) , T. Fukuda (KEK) , S. Kubono (CNS. Univ. Tokyo)
1998. 10. 23 ~ 10. 24	KPS Meeting at Chonbuk Univ.	H. Ejiri (RCNP. Osaka Univ.), M. Tanaka (Kobe Tokiwa College), H. Akimune (JAERI)
1999. 3. 28 ~ 3. 31	JPS Meeting at Hiroshima	H. C. Bhang (SNU), IL-T. Cheon (Yonsei Univ.), S. A. Shin (Ewha Woman's Univ.), K. S. Sim (Korea Univ.)
1999. 10. 15 ~ 10. 16	KPS Meeting at Pukyung Univ.	Y. Akaishi (KEK. Tanashi), A. Hayashigaki (Yukawa Inst.), Y. Mochizuki (RIKEN), T. Sugitate (Hiroshima Univ.), N. Saito (RIKEN)
2000. 3. 30 ~ 4. 2	JPS Meeting at Kinki Univ. (at Osaka)	H. C. Kim (Pusan Univ.), H. Y. Hwang (Mokwon Univ.), B. G. Yu (Hankuk Aviation Univ.) S. H. Lee (Yonsei Univ.)
2000. 4. 28 ~ 4. 29	KPS Meeting at the Korea Military Academy	Hiroyuki Sagawa (Univ. of Aizu), Naoyuki Itagaki (RIKEN), Takashi Nakamura (Tokyo Institute of Technology), Hiroyoshi Sakurai (Univ. of Tokyo)
2002. 3. 24 ~ 3. 27	JPS Meeting at Ritsumeikan Univ.(立命館大學)	IL-T. Cheon(Yonsei Univ), Y. D. Kim(Sejong Univ), J. K. Ahn(Pusan Univ), Y. I. Kwon(Yonsei Univ)
2002. 10. 24 - 10. 25	KPS 50th Anniversary Meeting DNP 30th Anniversary Meeting at Hanyang University,	H. Toki (RCNP) , T. Nakano (RCNP), O. Hashimoto (Tohoku University) , I. Tanihata (RIKEN) , S. Shimoura (CNS, Tokyo) , H. Horicuchi (Kyoto) , N. Takigawa (Tohoku) T. Nagae (IPNS, KEK) , Gono (Kyusu)
2003. 3. 28 ~ 3. 31	JPS Meeting at Sendai	Dong-Pil Min (Seoul National Univ.) , H-Ch. Kim (Pusan National Univ.), H. Kim (Yonsei Univ.) J. K. Ahn (Pusan National Univ)
2003. 10. 24 ~ 10. 25	KPS Meeting at Kyungpook University	Toru Sugitate (Hiroshima Univ.), Masayuki Asakawa (Kyoto Univ.), Atsushi Hosaka (RCNP, Osaka Univ)
2004. 3. 26 ~ 3. 30	JPS Meeting at the Kyushu University at Fukuoka	Byungsik Hong (Korea Univ.), Chang Hwan Lee (Pusan National Univ.), In Kwon Yoo (Pusan National Univ.), Yong Kyun Kim (KAERI)

APCTP-BLTP Workshops

(APCTP: Asia Pacific Center for Theoretical Physics)

1. 2007. 6. 18. ~ 23.
BLTP-JINR, Dubna, Russia
2. 2008. 4. 20 ~ 24.
APCTP, Pohang, Korea
3. 2009. 5. 27 ~ 31.
BLTP-JINR, Dubna, Russia
4. 2010 6. 24 ~ 26.
APCTP, Pohang, Korea
5. 2011 5.15 ~ 20.
BLTP-JINR, Dubna, Russia
6. 2012 10. 8 ~ 10. (Scheduled)
APCTP, Pohang, Korea












APCTP - BLTP JINR
International Workshop

June 18 - 23, Dubna

The Workshop is devoted to cooperation between the Asia Pacific Center for Theoretical Physics and the Bogoliubov Laboratory of Theoretical Physics of the Joint Institute for Nuclear Research in the following fields of theoretical physics:

Theoretical Nuclear Physics
Quantum Field Theory
Elementary Particle Physics
Particle Astrophysics
Condensed Matter and Solid State Physics



Speakers:

Alexander E. Dorokhov (BLTP JINR)
Sergei N. Ershov (BLTP JINR)
Alexei V. Gladyshev (BLTP JINR)
Jong Bae Hong (Seoul National University)
Seungwoo Hong (Sungkyunkwan University)
Rostislav V. Jolos (BLTP JINR)
Sang Pyo Kim (Kunsan National University)
Wooyoung Kim (Kyungpook National University)
Nikolai I. Kochelev (BLTP JINR)
Hyung Tae Kook (Kyungwon University)
Suhoung Lee (Yonsei University)
Vadim A. Naumov (BLTP JINR)
Vladimir V. Nesterenko (BLTP JINR)
Vladimir A. Osipov (BLTP JINR)
Richard Pincak (BLTP JINR)
Vyacheslav B. Priezzhev (BLTP JINR)
Alexei P. Severyukhin (BLTP JINR)
Yuri M. Shukrinov (BLTP JINR)
Alexander V. Sidorov (BLTP JINR)
Alexei N. Sissakian (BLTP JINR)
Alexander S. Sorin (BLTP JINR)
Viacheslav D. Toneev (BLTP JINR)
Victor V. Voronov (BLTP JINR)

Organizers: Sang Pyo Kim (Kunsan National University), Victor V. Voronov (BLTP JINR)

Contact: S. Nedelko | nedelko@theor.jinr.ru | phone: +7-49621-63508 | BLTP, JINR, 141980 Dubna, Moscow region, Russia

ANPhA

Asian Nuclear Physics Association

<http://ribf.riken.jp/ANPhA/bylaws.html>

Member countries: Australia, China, India, Japan, Korea, Vietnam



Supporting Institutions

KPS	Korean Physical Society
ICPR	Information Center for Physics Research
APCTP	Asia Pacific Center for Theoretical Physics
NRF	National Research Foundation

The 5th Asia-Pacific Conference on Few-Body Problems in Physics

August 21~26, 2011
Seoul  Korea
International Hall, Sungkyunkwan University

TOPICS

Few-hadron systems and their interactions
Hadron structure and QCD
Exotic hadrons and atoms
Hadrons, few-body problems and nuclear matter from holographic QCD
Effective field theory in few-body physics
Few-body approaches to structure of light nuclei and hypernuclei
Few-body systems near stability and their interactions
Symmetries and symmetry breaking
Electroweak interactions in few-hadron systems
Atomic and molecular systems
Other related subjects

INTERNATIONAL ADVISORY COMMITTEE

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K. K. Seth / Northwestern University
P. Sueka / Suranaree University of Technology
L. Tomoa / Fluminense Federal University
T. Vaithong / Chiang Mai University
H. Witala / Jagiellonian University
S. H. Yang / National Taiwan University
B. S. Zou / Institute of High Energy Physics

LOCAL ORGANIZING COMMITTEE

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Hyongchan Bhang / Seoul National Univ.
Myung-Mi Cheoun / Soongsil Univ.
Seonho Choi / Seoul National Univ.
Seung-Woo Hong / Sungkyunkwan Univ.

Chang Ho Hyun / Daegu Univ.
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Yuangman Kim / APCTP
Wooyoung Kim / Kyungpook National Univ.
Seung-il Nam / Korea Aerospace Univ.

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Website www.apctp.org/conferences/2011/APFB2011/



November 14-17, 2012
Pusan National University (PNU)
Haeundae Grand Hotel, Pusan, South Korea

The 4th Asian Triangle Heavy Ion Conference



ATHIC 2012

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TOPICS

- Jet propagation and medium response in QGP
- Properties of strongly coupled QGP
- Exploring QCD phase diagram
- Nuclear astrophysics (compact stars, black holes)
- Future projects (RHIC-II, LHC, J-PARC, FAIR etc.)

<https://hipex.phys.pusan.ac.kr/athic2012>



Thank you

Energy Eigenvalues for a Spherical Well with an Exponentially Diffuse Boundary*

ALEX E. S. GREEN AND KIUCK LEE†

Department of Physics, The Florida State University, Tallahassee, Florida

(Received March 23, 1955)

The discrete energy eigenvalues of a spherical well with an exponentially diffuse boundary are obtained to a good approximation for a range of well parameters of interest in nuclear physics. The method used involves replacing the centrifugal energy in the exponentially diffuse region by an approximate expression which leads to analytic solutions of the wave equation. The matching of the internal and external wave functions is then accomplished by the use of specially prepared graphs and tables. The eigenvalues and eigenfunctions are thought to be of interest in connection with studies of the independent particle model of the nucleus.

1. INTRODUCTION

A NUMBER of recent studies¹⁻³ have stimulated interest in the problem of a single particle in a central field with a diffuse boundary. While most of this interest has been in connection with the positive energy

Letting $\rho=r/a$, the radial wave equation becomes

$$G'' + [\epsilon'^2 - l(l+1)\rho^{-2}]G = 0, \quad \rho < 1 \quad (5)$$

and

$$G'' - [\epsilon_w^2 + l(l+1)\rho^{-2}]G = 0, \quad \rho > 1, \quad (6)$$

$$\epsilon'^2 = \epsilon_0^2 - \epsilon_w^2. \quad (4)$$

$$E_0(x) = x, \quad (12)$$

* This investigation was supported by grants from the U. S. Atomic Energy Commission and Florida State University Research Council.

† On leave from the Seoul University, Seoul, Korea. This work will serve as a portion of a dissertation to be submitted by Kiuck Lee in partial fulfillment of the requirements for a Ph.D. degree at the Florida State University.

¹ R. D. Woods, dissertation, University of California, August, 1954 (unpublished).

² D. M. Chase and F. Rohrlich, *Phys. Rev.* **94**, 81 (1954).

³ Feshbach, Porter, and Weisskopf, *Phys. Rev.* **96**, 448 (1954).

⁴ H. Margenau, *Phys. Rev.* **46**, 613 (1934).

the higher integral order $E_l(x)$ were generated. To obtain higher order $I_l(x)$ including nonintegral orders which are needed in Sec. 3, tabulated Bessel functions for orders between $-\frac{1}{2}$ and $+\frac{1}{2}$ were first used to generate the corresponding I_l functions. Then Eq. (10) was used to generate the higher order functions. In Fig. 1 and Fig. 2 the values of various $I_l(x)$ and $E_l(x)$ are plotted at abscissas corresponding to x^2 . These graphs

Double β Decay Experiment at Yang Yang Power Plant

Access to the lab by car 2km tunnel from gate.

Clean room with an air conditioning system for a constant temperature and low humidity



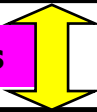
Nuclear Data Lab. in KAERI

IAEA, OECD, BNL, ORNL, JAEA etc.



International Nuclear Data Network

Inter. Collaborations



Nuclear Data Lab @KAERI
Evaluation, processing, validation &

Domestic Nuclear Data Measurements

- eV pulse neutrons
 - neutron resonance
 - photonuclear reactions
- PNF @ PAL**

- MeV pulse neutrons
 - neutron fields
 - MeV neutron reactions
- VDG @KIGAM**

- keV pulse neutrons
 - keV neutron reactions
- Electron Acc. @KAERI**

fast neutron and CP
Surrogate reactions
Reverse kinematics
@KoRIA



Nuclear Data for Nuclear R&D

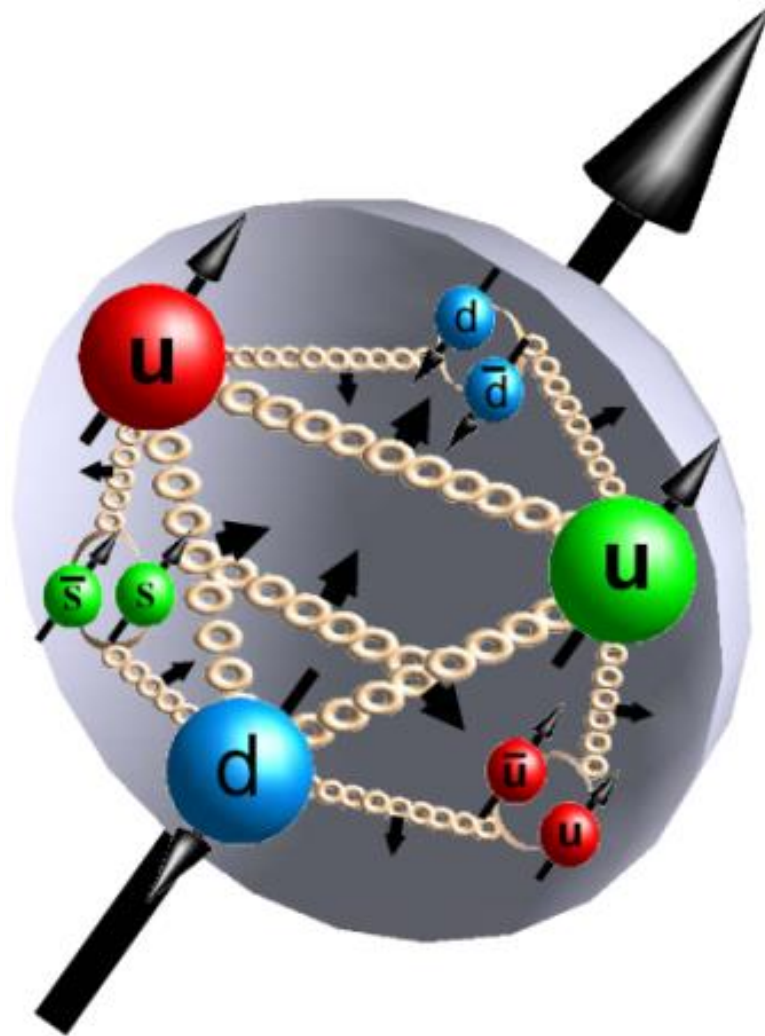


- ✓ GEN-IV reactors (SFR etc.)
- ✓ Advanced Fuel Cycle
- ✓ Fusion (nuclear/ atom/ molecular)
- ✓ Accelerator applications
 - medical accel. (charged particles)
 - resource & environment (gamma)
- ✓ Space applications (p < 400 MeV)

Hadron Physics

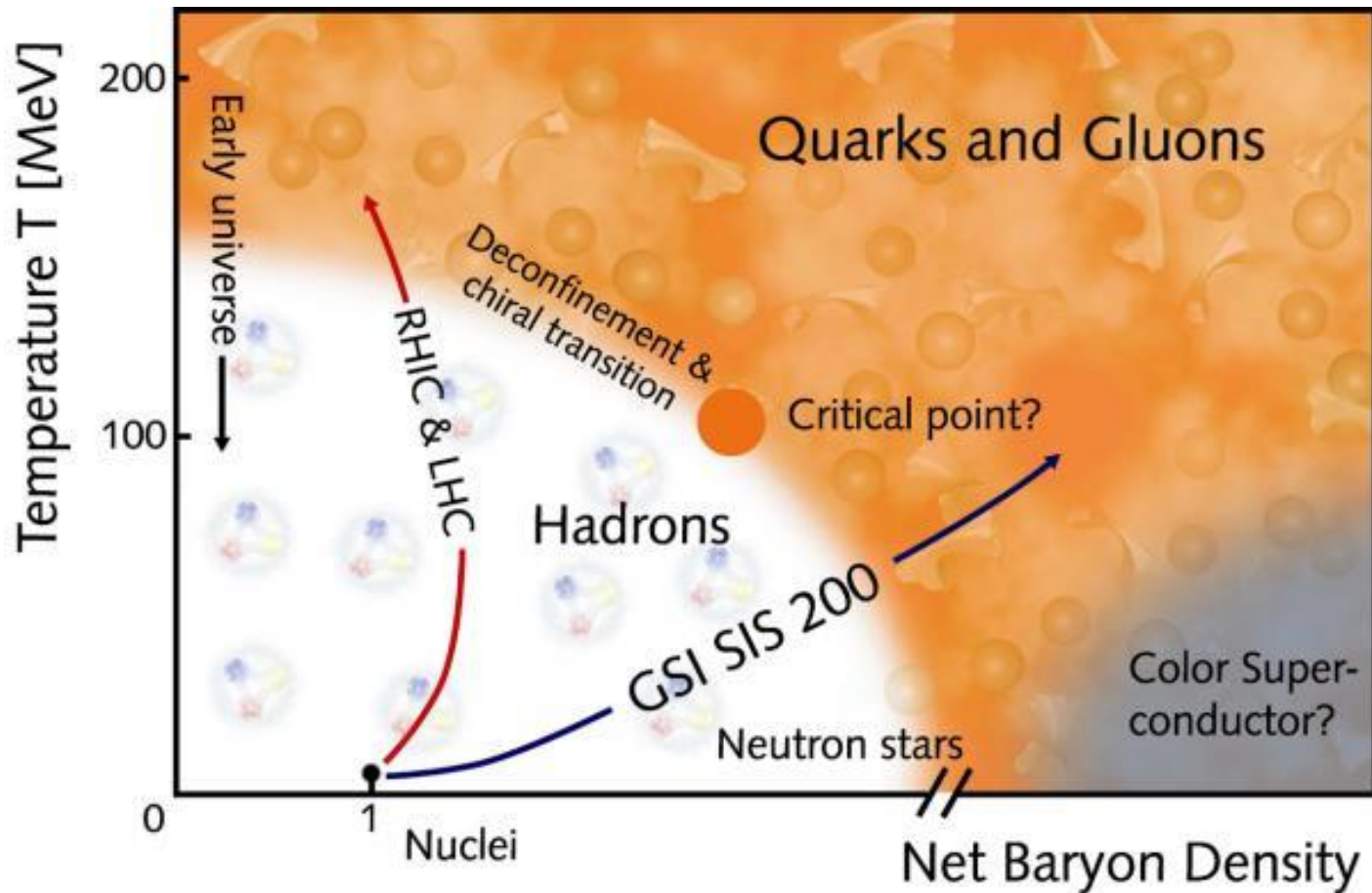
- Excited nucleons and Spectra of Hyperons
- Strangeness in nucleon (Strangeness form factor)
- Exotic hadrons (tetraquarks, pentaquarks, etc)
- Generalized parton distribution for hadrons
- Spin structure of the proton
- Nonperturbative QCD (Instanton, monopole, AdS/QCD...)
- JLAB, SPring-8, J-PARC, PANDA, ELSA...

Hadron Physics



High Energy Heavy Ion Physics

Nuclear Physics under extreme conditions



Heavy Ion Nuclear Physics

- **Experiments**
 - **RHIC @ BNL**
 - **STAR Asian Computing Center (Pusan Nat. Univ. + KISTI)**
 - **PHENIX – about six universities**
 - **FAIR @ GSI**
 - **ALICE, CMS-Heavy ion @ CERN**
- **Theory**
 - **QCD sum rules**
 - **Transport models**
 - **Schematic models**

Heavy Ion Nuclear Physics

- **HIM (Heavy Ion Meeting)**
 - Working group meeting of Korea in heavy ion physics since Dec. 2004
 - ~ 50 members (Ph.D): Mannque Rho etc
 - 4-5 meetings per year
- **ATHIC (Asian Triangle Heavy Ion Conference):** Korea, Japan, China
 - 2006: Seoul, Korea 2008: Tsukuba, Japan 2010: Wuhan, China



The AMS Facility at SNU

- 3MV Tandetron(electrostatic)
- 3 ion sources
 - 1 Cs-sputtering source : carbon AMS dedicated
 - 1 Cs-sputtering source for MPS beamline (Solid material)
 - 1 duoplasmatron for MPS (for gas)
- 5 beam ports
- Mass spectroscopy system for carbon AMS



SNU AMS model 4130 tandem electrostatic accelerator

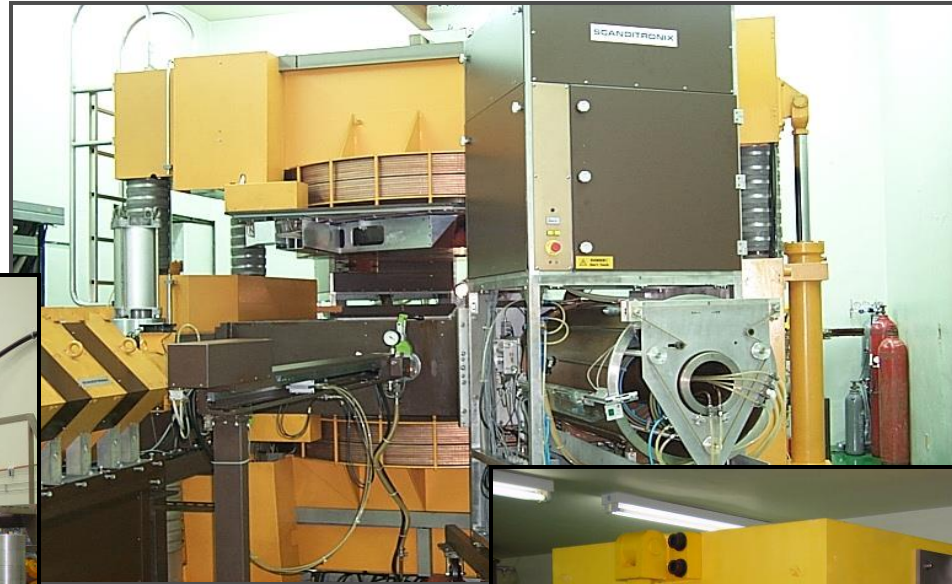
The AMS Facility at SNU

- AMS(Accelerator Mass Spectroscopy)
 - ionize the sample to ion beam and accelerate to a definite kinetic energy, then analyze the momentum to get mass
 - Radiocarbon dating
 - Tracer application
- Ion Beam facility
 - PIXE/PIGE
 - Thermonuclear reaction study
 - Ion implantation

Cyclotron Facilities at KIRAMS

KIRAMS: Korea Institute of Radiological and Medical Sciences

MC50 :Nuclear Science Research

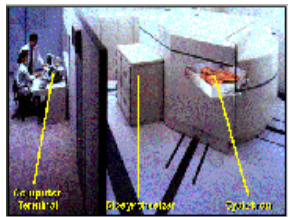
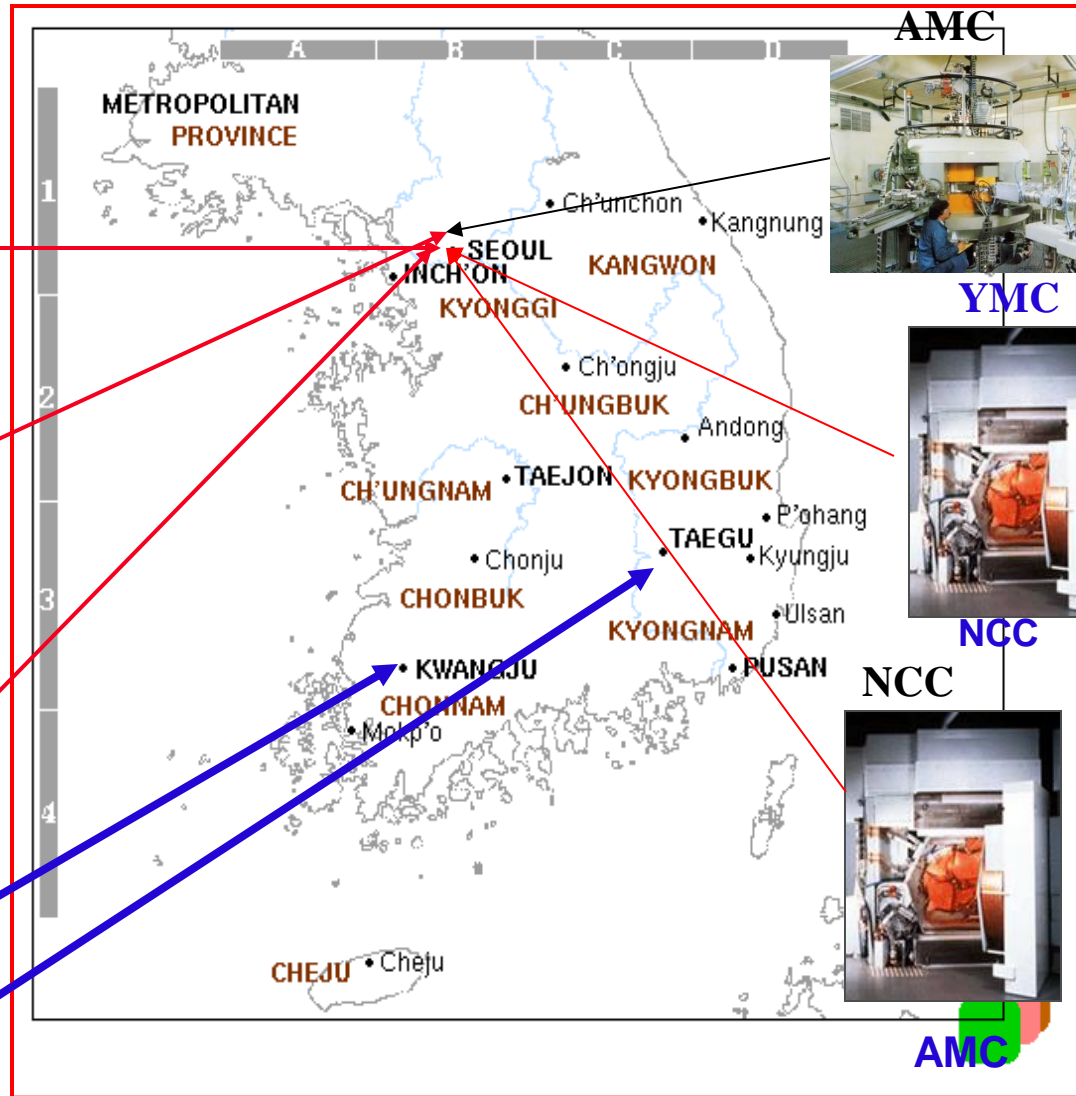


Cyclone30 :Tl-201,I-123,Ga-67

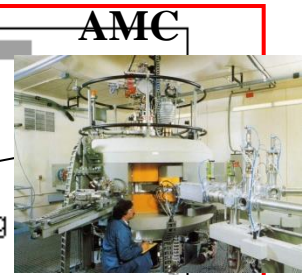


KIRAMS-13:F-18, C-11

Cyclotrons in Korea



SNU



AMC

YMC



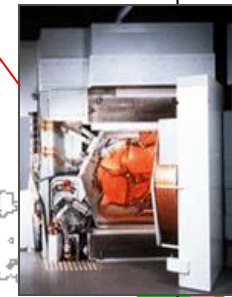
SMC



NCC

NCC

KCCH

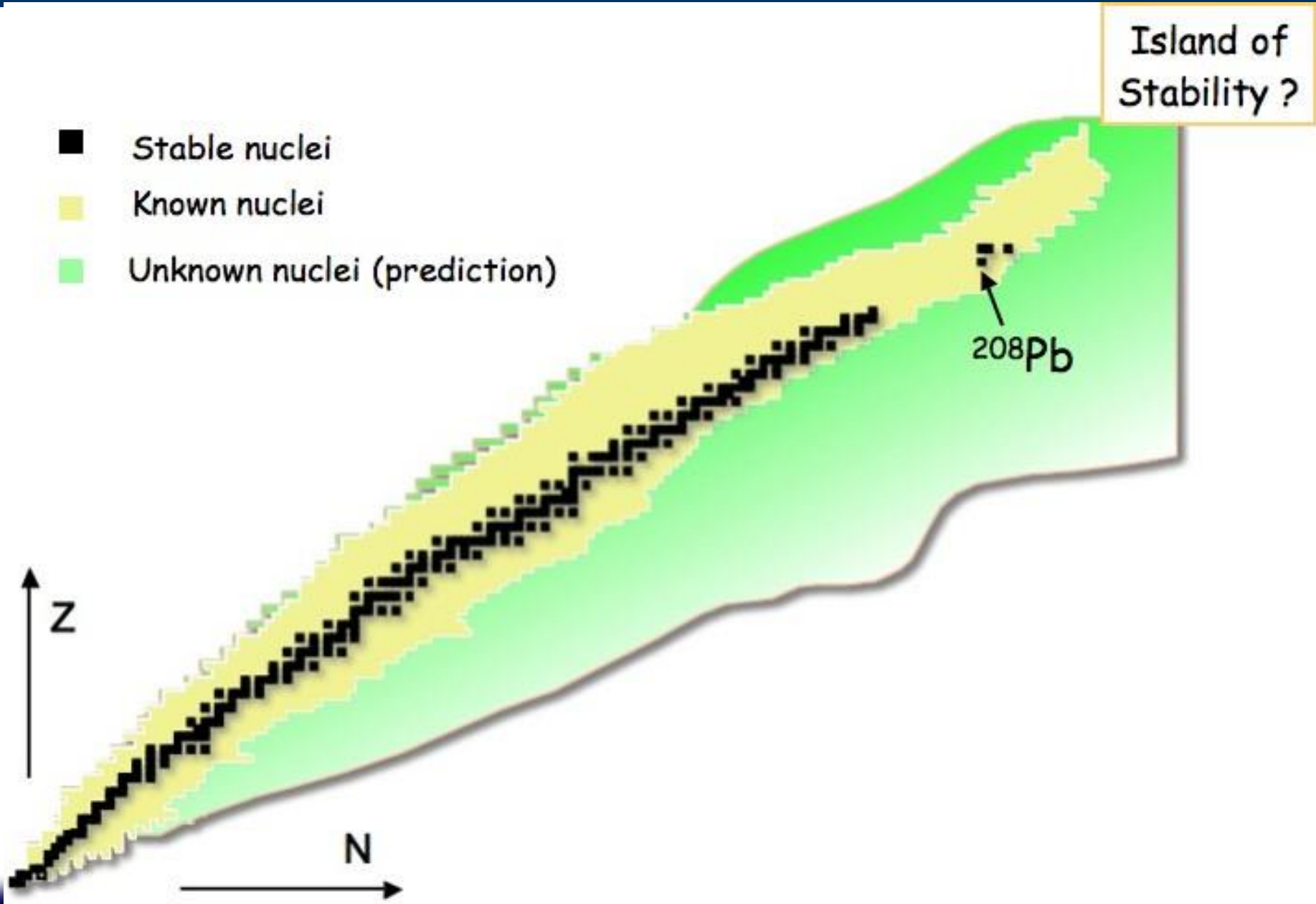


AMC

Accelerators in Korea

1. Pohang Light Source
2.5 GeV electron LINAC: Material and bio sciences
2. **KIRAMS** (Korea Institute of Radiological and Medical Sciences)
18 Cyclotrons (50 MeV, 30 MeV 0.6mA, 13 MeV): RI production
3. KIGAM(Korea Institute of Geoscience and Mineral Resources)
0.5 ~ 2 MeV Van de Graaf: Material sciences
4. Seoul National University
3MV Tandetron: AMS
5. **PEFP KAERI** (Korea Atomic Energy Research Institute)
100 MeV 20mA proton LINAC
6. National Cancer Center
235 MeV Proton Cyclotron: Proton therapy

Nuclear chart



Korea-Japan Exchange Program

- 1994: Discussion and proposal by Y. Ishihara (RIKEN) and Il-T. Cheon (Yonsei University)
- 1998: Exchange program started and continued until now
- In spring, Koreans participate in JPS meeting.
In fall, Japanese participate in KPS meeting.
- 2005 – 2012, Participants are recommended by the committee.