Interests of Physics in EIC and Plan to Contribute to ePIC

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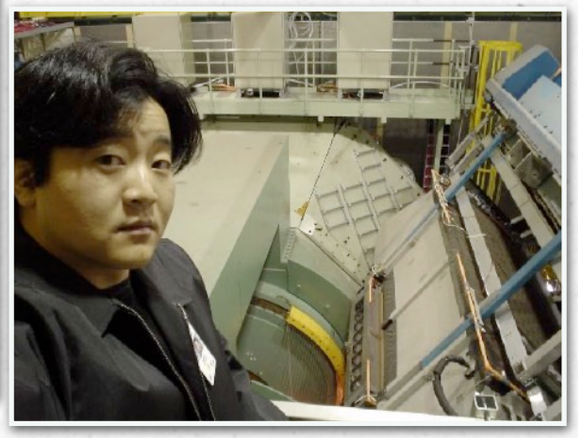
TOHOKU
UNIVERSITY

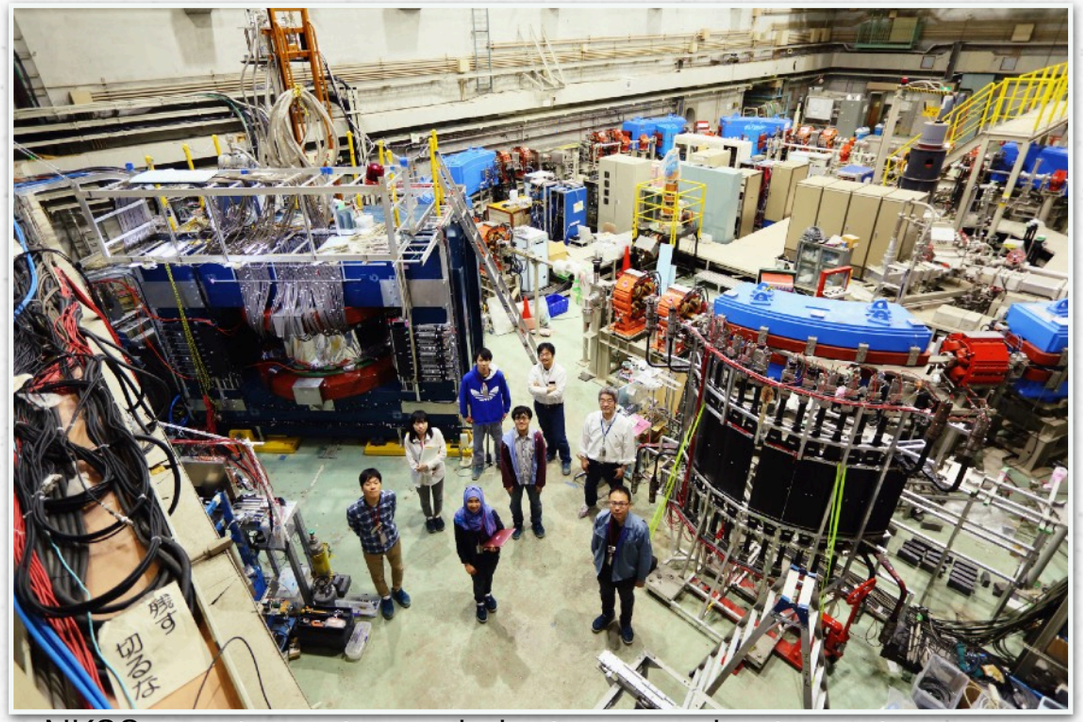
Career and Physics in Research

- 1994 (Ph.D student) - 2005 (Postdoc)
  - Quark-Gluon Plasma search and Hadron physics in heavy ion collisions
    - CERN-SPS, BNL-RHIC
  - Spin physics at RHIC
- 2005 (Assistant Prof.) - present (Associate Prof.)
  - Strangeness nuclear physics
    - Hypernulcear spectroscopy
    - Λn, Λp scattering experiment
    - Strangeness photo production

NA44 counting room



View from electronics hutch of PHENIX



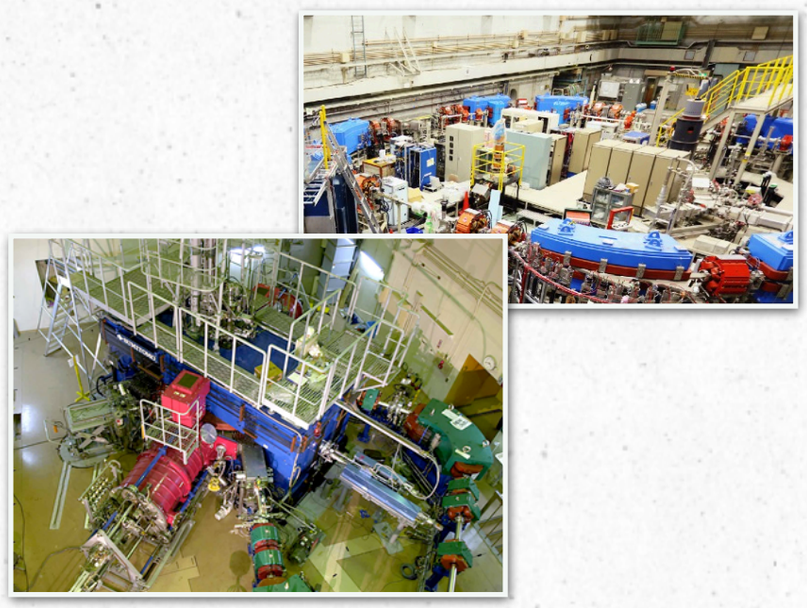
NKS2 spectrometer and electron synchrotron at RARiS, Tohoku Univ.

Physics Interests in EIC

- Question
  - Relation between early thermalization of QGP and parton distribution (Gluon saturation at small-x)
  - Confinement of quarks and gluons
- Based on my past works
  - Thermal/chemical freeze-out study in heavy ion collisions
    - Why early thermalization?
- Some knowledge what I have seen and heard in
  - Spin program at RHIC
  - DIS experiment at JLab
    - We use small-Q^2 virtual photon to produce hypernuclei with electron beam

Contribution to ePIC

- Detector R&D
  - Wish to join to the R&D group of AC-LGAD
    - Interest of PID detectors in my career
    - Discussion with Hiroshima group started
    - Enhance the activities of EIC physics in Japan
  - Environment and experience to develop
    - There are rooms for the detector R&D in our group
    - Tohoku Univ. has an accelerator facility, RARiS
      - Synchrotron: 1.3 GeV electron
        - 0.75 - 1.25 GeV tagged photon
        - ~0.8 GeV $e^{\pm}$ from photon conversion
      - Cyclotron: 80 MeV proton, 85 MeV ^{4}He, C, N, O, Ne, Si, At, Fe, Kr, Xe
    - Experience of detector R&D and construction of spectrometer in small group



- Human resources
  - Currently, myself (from 2 Profs., 2 Assocs., and 1 Asst.)
    - I just started my career as assoc. prof. from this fiscal year
    - Some people have the interest in the EIC physics at Tohoku Univ.
  - One to two Ph.D student(s) each year

Summary

- Career and physics research
  - Ph. D. student and postdoc eras
    - QGP search in heavy ion collisions at SPS and RHIC
    - Spin physics at RHIC
  - Faculty staff at Tohoku Univ.
    - Strangeness nuclear physics
      - strangeness photo-production
      - Lambda-N interaction
- Physics interest in EIC
  - Early thermalization of QGP and parton distribution at small-x
  - Confinement of quark and gluon
- Contribution to ePIC
  - Detector R&D
  - Enhance activities of EIC physics in Japan

Backup

Career and Physics in Research

- 1994 - 1999, graduate student in Hiroshima Univ.
  - NA44, CERN-SPS
    - Particle ratios and m_T spectrum of $\pi^{\pm}$, $K^{\pm}$, p, p-bar in Pb+Pb collision
    - Discussion of the thermal and chemical freeze-out
  - PHENIX, BNL-RHIC
    - Development of Beam-Beam counter
- 1999, postdoc of KEK for PHENIX
  - Installation of TOF counter worked with Tsukuba group
- 1999 - 2002, postdoc of LBL for STAR
  - π^0 spectrum analysis via $\gamma \rightarrow e^+e^-$ (published in PRC) and γ v_2 in Au+Au worked with I. Johnson and T.J. Symons
  - Leading the discussion of the thermal and chemical freeze-out
- 2002-2005, postdoc of RBRC for PHENIX
  - Software development about spin program
  - Analysis of π^0 v_2 (published in PRL) in Au+Au, and anti-n, θ^+ analysis
  - Conniver of global hadron PWG

Career and Physics in Research

- 2005 - Present
  - Assistant professor, and then Associate professor in Tohoku Univ.
  - Research in strangeness nuclear physics
    - ΛN interaction
      - Hypernuclear spectroscopy about Λ binding energy at JLab and MAMI-Mainz Univ.
      - Λ*p* scattering experiment at SPring-8
      - Λ*n* interaction via Final-State-Interaction at ELPH, Tohoku Univ.
    - Strangeness photo production
      - Production mechanism in γ+n reaction
  - Detector R&D
    - Drift Chamber
    - Time-Of-Flight counter and photon tagging counter
      - Plastic scintillator + SiPM (MPPC)
    - Aerogel Cherenkov counter with PMT
  - Data acquisition system
    - Trigger circuit by NIM modules and FPGA modules
    - Readout system by VME