Summary of Nuclear/Hadron Physics Working Group

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Nuclear/Hadron Physics Working Group (#2 group)

- Co-convenors: Spinka (ANL), Nakano (RCNP) and Sawada (KEK)
- More than 40 people for the combined session (#1&#2)
- About 20 people for the #2 dedicated session
- Talks:
  - 2 plenary talks (Spinka and Widmann)
  - 3 talks at #1-#2 combined session (Kienle, Kopeliovich, Sakaguchi)
  - 10 talks/comments at #2 dedicated session
- Discussions at the end of the #2 session

Subjects discussed

- Complementary future project at GSI (Kienle)
  - Multipurpose facility
  - Not officially approved yet. Some of the ideas can be realized at JHF.
- Research using (high momentum) p, p-bar, pi, K,...
  - Hadron physics is very well summarized by the plenary talk by Dr. Spinka.
    - Partonic content of nuclei
      - Dimuon measurement (Sawada)
    - Transition region between nucleon+meson and quark+gluon pictures
    - Baryon and meson spectroscopy
      - Possibility of pol. p-bar beam
      - Talks by Peaslee and Tsuru
        - » RF separator for K beams is now under development at IHEP (Protovino) which may be moved to JHF. JHF has much higher (orders) proton intensity.
  - Nuclear-matter-related physics
    - "Spectral function" (Asakawa)
      - Fruitful phase diagram.
    - Vector meson modification (Ozawa)

Subjects Discussed (cntd.)

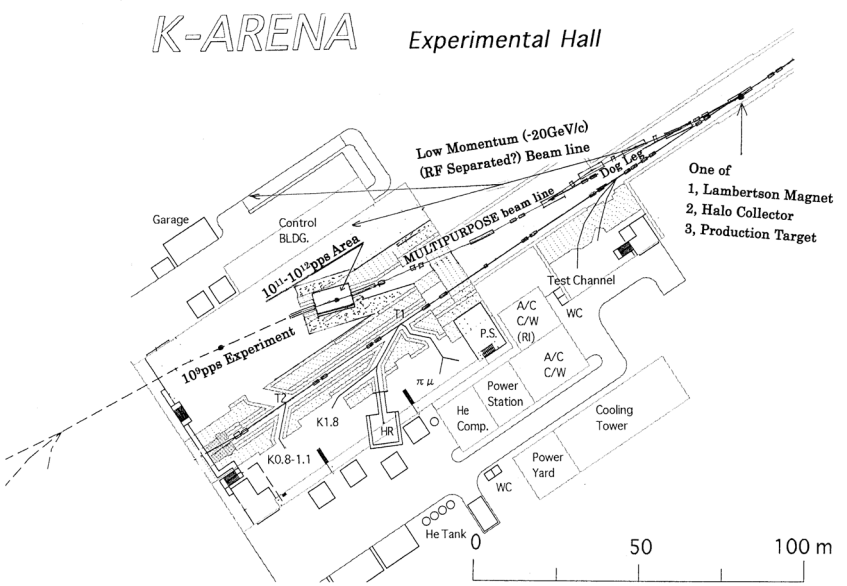
    - Multifragmentation (Tanaka)
- Research using HI beams
  - Unique tool to study “relativistic hypernuclei” (Sakaguchi)
  - Important and unique tool to study nuclear matter with high baryon density (Sugitate)
    - Experimental setup for flow measurement was proposed. (Esumi)
- Research using polarized proton beams
  - Spin physics
    - Parity violation experiments (Arvieux)
  - Prof. Hatanaka suggested polarized beam might be able to be accelerated with “tune jump” method.
- Research using ultra-slow antiprotons (Widmann)
  - Not only atomic physics, but also fundamental physics.
  - They will transfer the antiproton decelerator to JHF after CERN experiments.

Strategy

- First of all, we should brush up the physics cases.
  - Uniqueness, relationship with experiments at other facilities, ...
  - Will make documentations in the coming year.
- For experiments using high momentum p, p-bar, pi, K, ...
  - Will start design work and R&D for the “multipurpose beam line”. The key is the quality of the beam. Beam channel expert (Tanaka) think we will be able to have a design of a good quality beam line in half a year.
  - Consider possibility of the RF separators.
  - Detector R&D will be started, including hadron blind detectors etc. by the subgroups. This is related with the ongoing research programs (RHIC, LHC, etc.).
- For HI experiments:
  - We should not only brush up the physics cases, but also consider various realistic possibilities of HI acceleration.
  - Will ask project headquarters to consider construction of the HI injectors with these studies.

Multipurpose Beam Line

- To accommodate various needs for beams from hadron physics experiments;
  - 50-GeV protons with ~10^{12} pps <= Str. Fn.
  - 50-GeV protons with ~10^{9} pps <= Vec. Meson
    - Very small beam size (~1mm2), stable, very small beam halo
  - 5~50-GeV variable energy protons with ~10^{9} pps <= Multifragmentation
  - 5~30-GeV variable energy secondary particles with ~10^{9} pps <= Multifragmentation & others
  - HI beams with 10^{10} ions per second



Strategy (cntd.)

- For polarized proton experiments:
  - Question on the needs of pol. proton beams at JHF is open, when we have pol. p beams at AGS/RHIC-Spin.
  - We should ask wide range of the physics communities.

My Personal Concluding Comments

- At the end of my summary, I would like to say:
  - We know many people who could not attend this workshop with regrets but have strong interests in this field at JHF.
  - This field has much relationship with ongoing projects in the world (RHIC, CERN, GSI, ...). Therefore our nuclear/hadron physics has many potential researchers who will come out as our real collaborators in near future.
  - A series of workshops, which may be held abroad, will be very valuable.