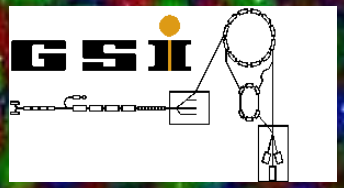
Heavy Ion Physics Experiments Survey



In-Kwon YOO (yoo@pusan.ac.kr)

Nuclear Research Institute

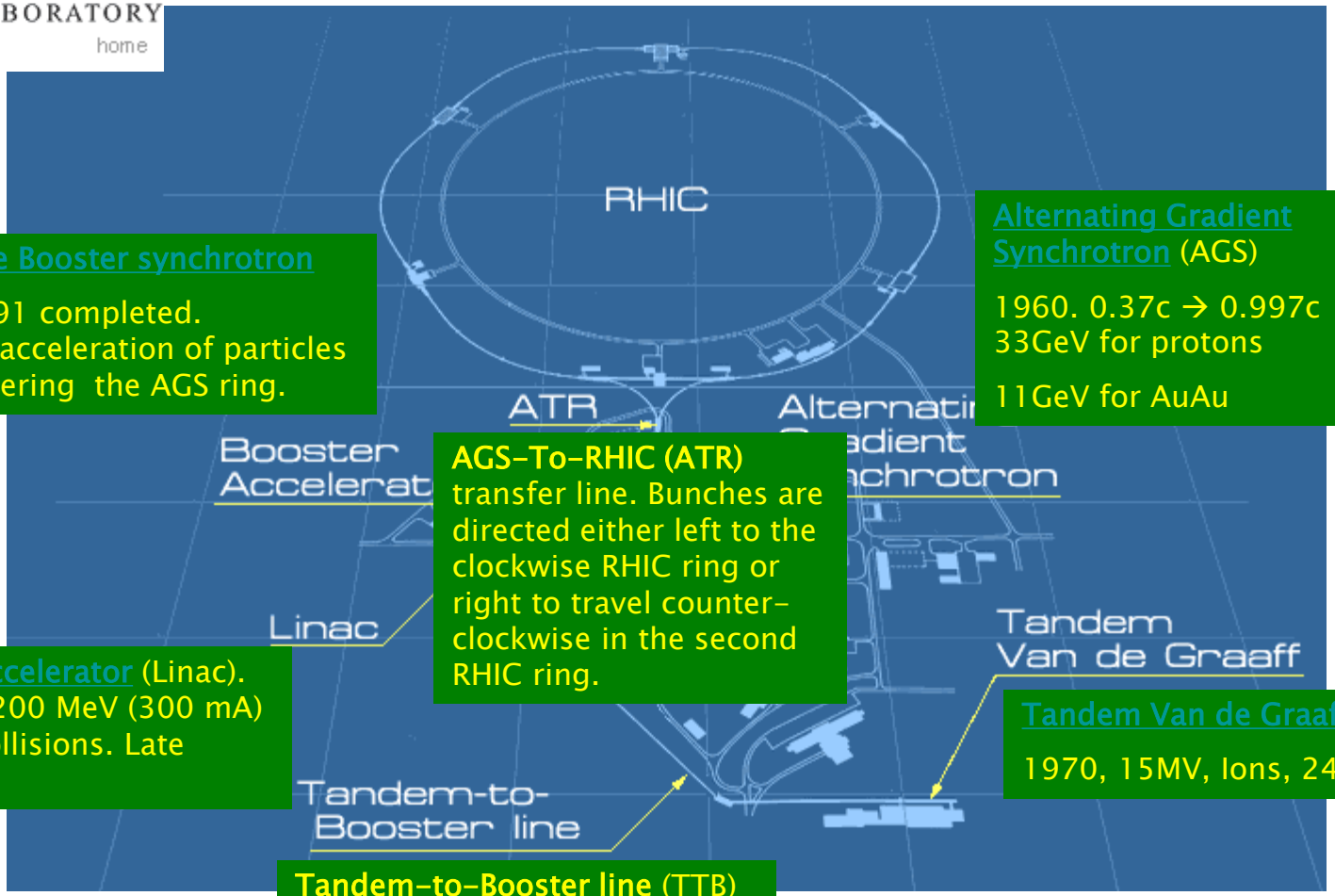
Pusan National University

Busan, Republic of KOREA

Accelerators – Labs : BNL

BROOKHAVEN NATIONAL LABORATORY
home

Since 1947



The Booster synchrotron

1991 completed. Preacceleration of particles entering the AGS ring.

Alternating Gradient Synchrotron (AGS)

1960. 0.37c → 0.997c
33GeV for protons

11GeV for AuAu

AGS-To-RHIC (ATR) transfer line. Bunches are directed either left to the clockwise RHIC ring or right to travel counter-clockwise in the second RHIC ring.

Linear Accelerator (Linac). Protons 200 MeV (300 mA) for pA collisions. Late 1960's.

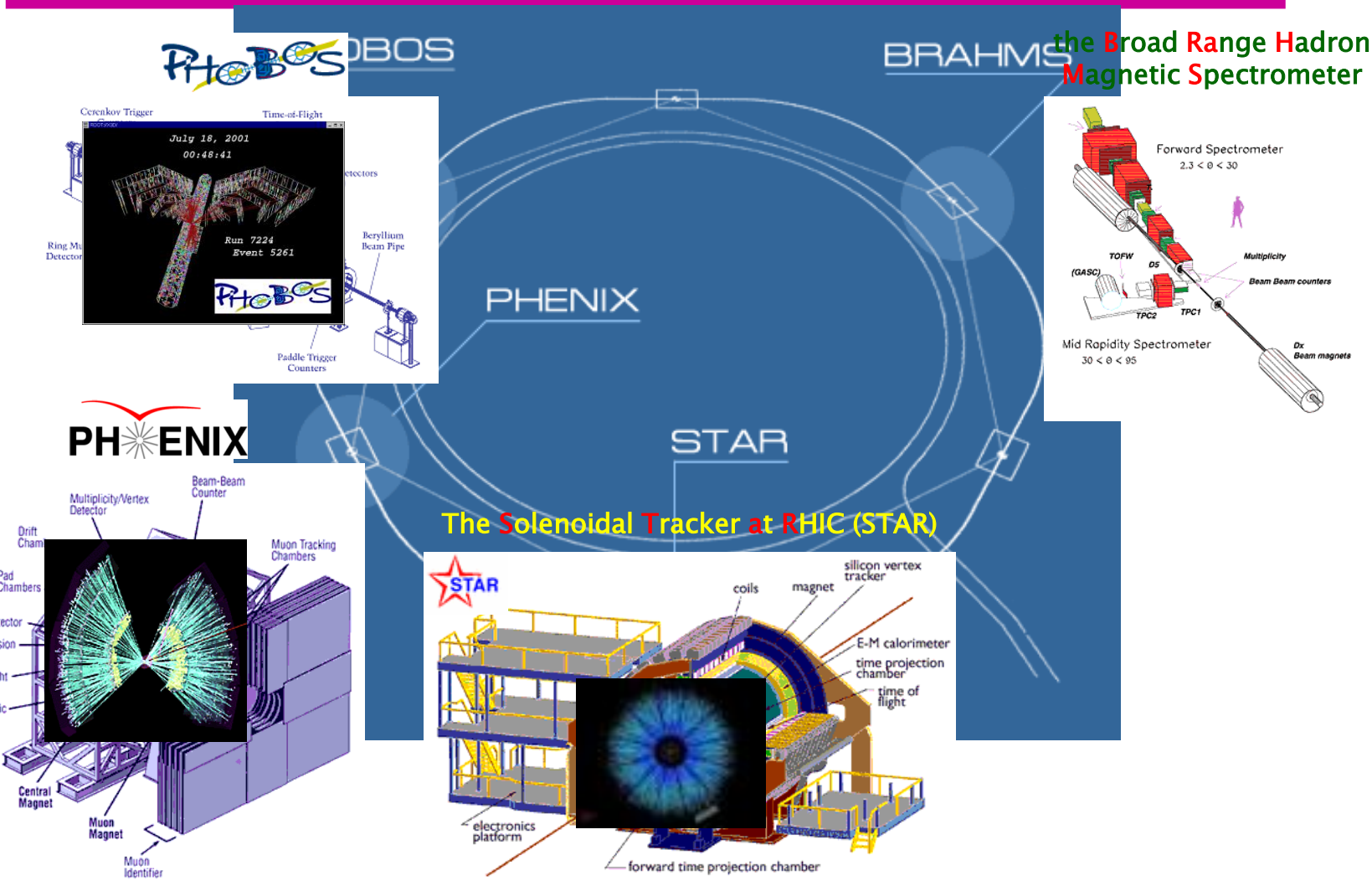
Tandem Van de Graaff

1970, 15MV, Ions, 24m

Tandem-to-Booster line (TTB)

1986, 700m, 0.05c

Experiments @ RHIC.BNL



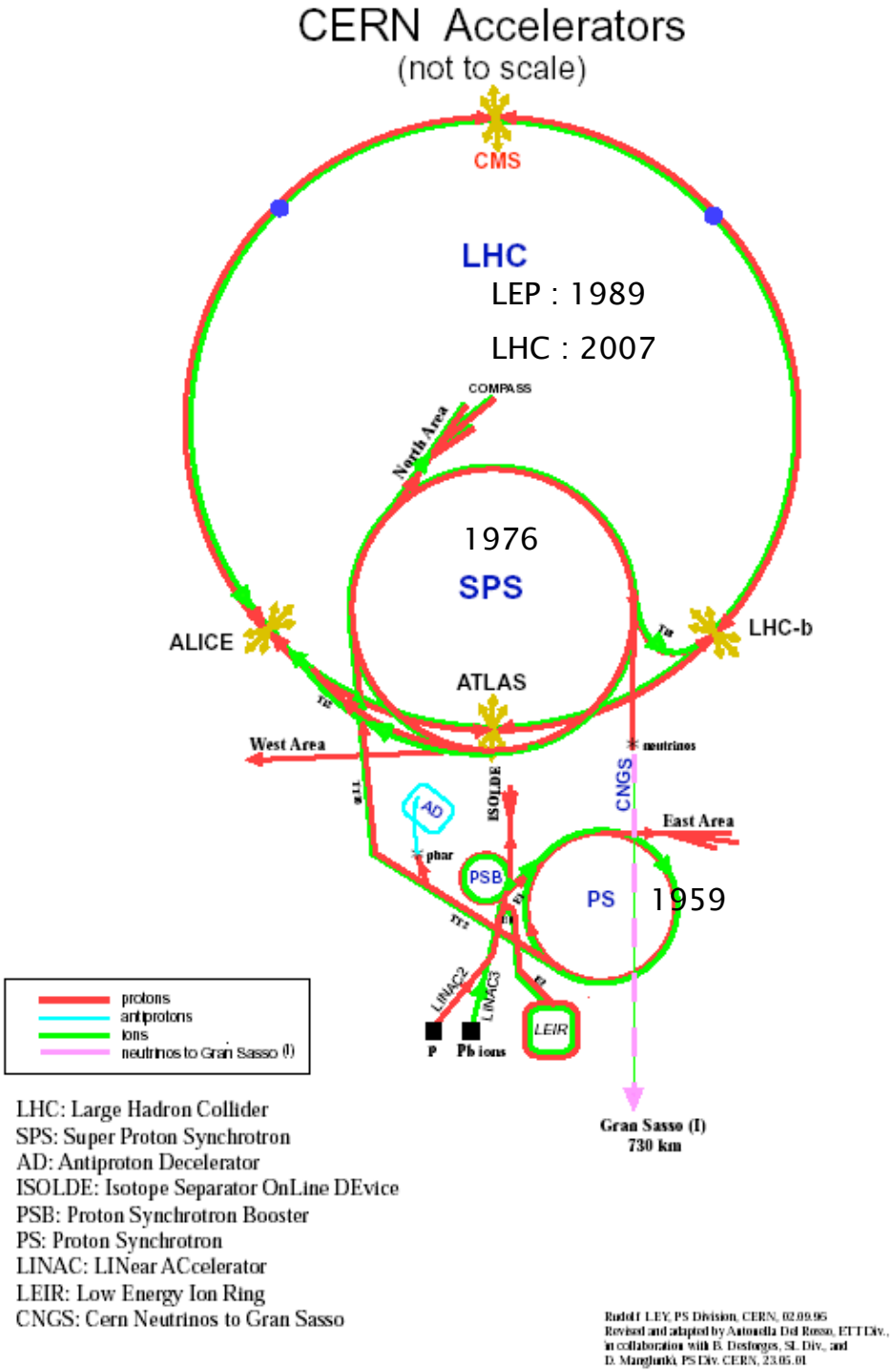
Acceleraters -

Organisation Européenne pour la Recherche Nucléair
European Organization for Nuclear Research

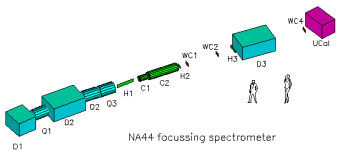
Since 1954

In-Kwon YOO

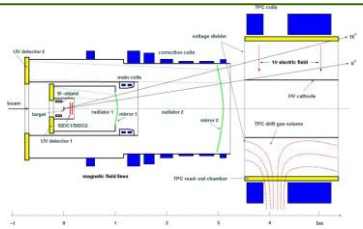
HIM @ Chon

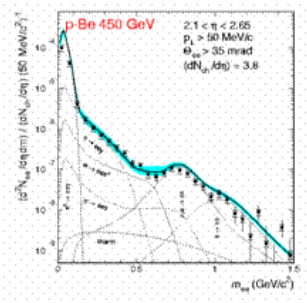


Experiments @ SPS.CERN

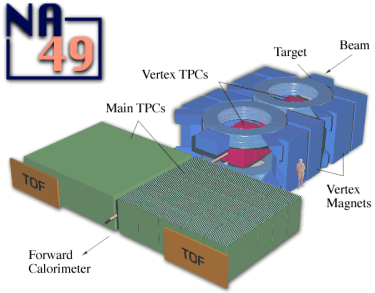


NA44 : The Focussing Spectrometer for one and two particles

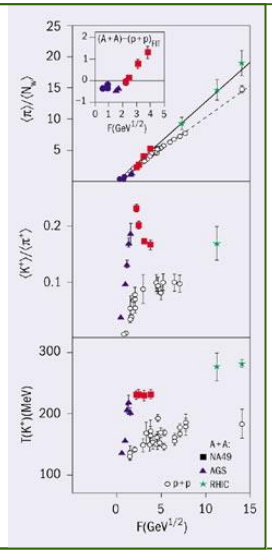


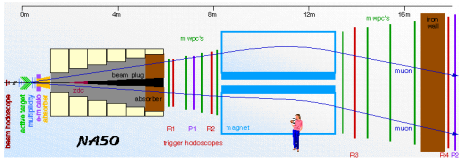


NA45 (CERES) : Study of Electron Pair Production in Hadron and Nuclear Collisions

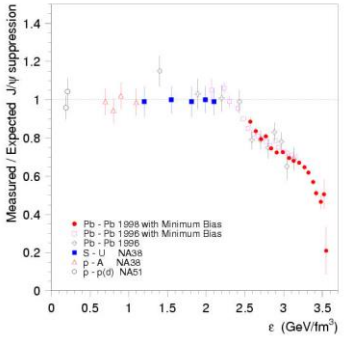


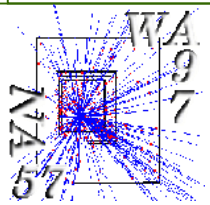
Large Acceptance Hadron Spectrometer



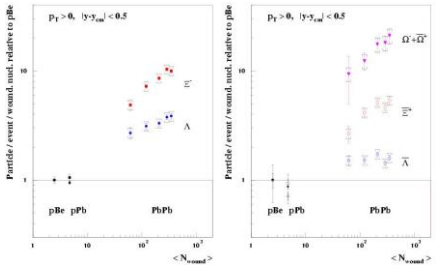


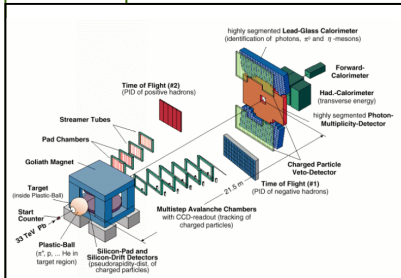
NA50 : Study of Muon Pairs and Vector Mesons





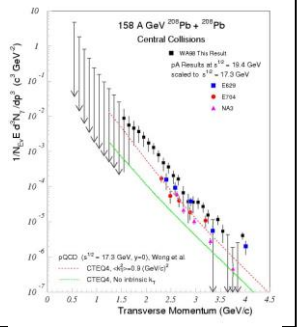
Study of Strange and Multistrange Particles



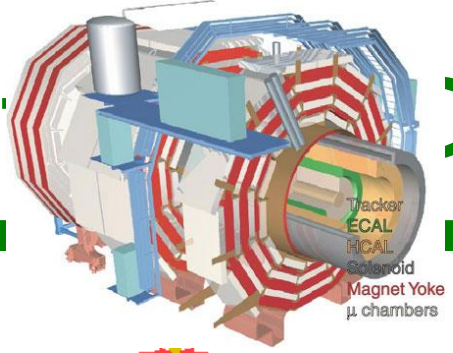


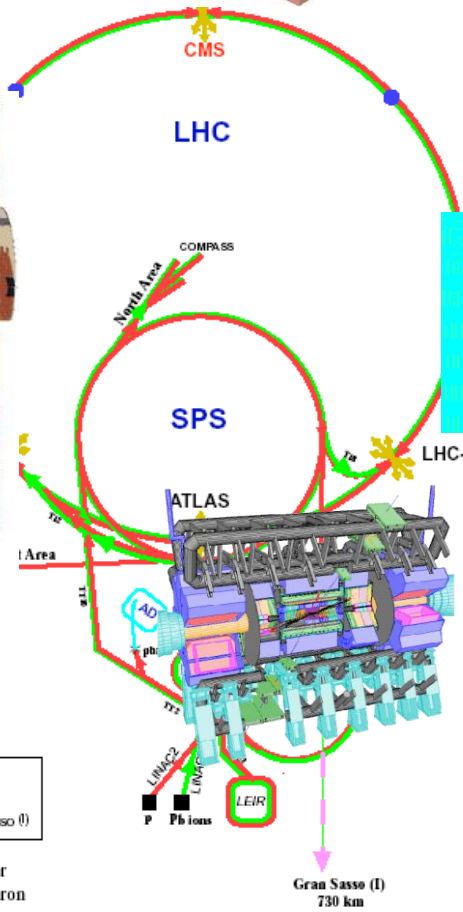
WA98 :

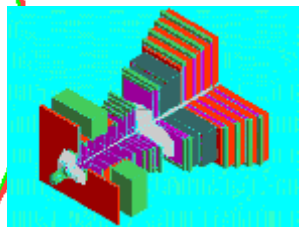
Direct photons



Experimen :.CERN



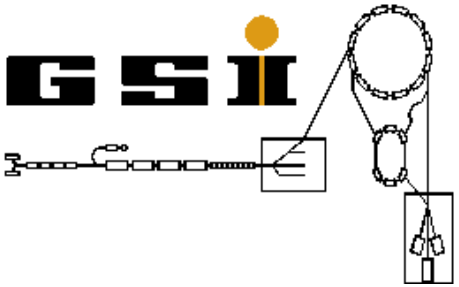




LHC: Large Hadron Collider
SPS: Super Proton Synchrotron
AD: Antiproton Decelerator
ISOLDE: Isotope Separator OnLine DEvice
PSB: Proton Synchrotron Booster
PS: Proton Synchrotron
LINAC: LINear ACcelerator
LEIR: Low Energy Ion Ring
CNGS: Cern Neutrinos to Gran Sasso

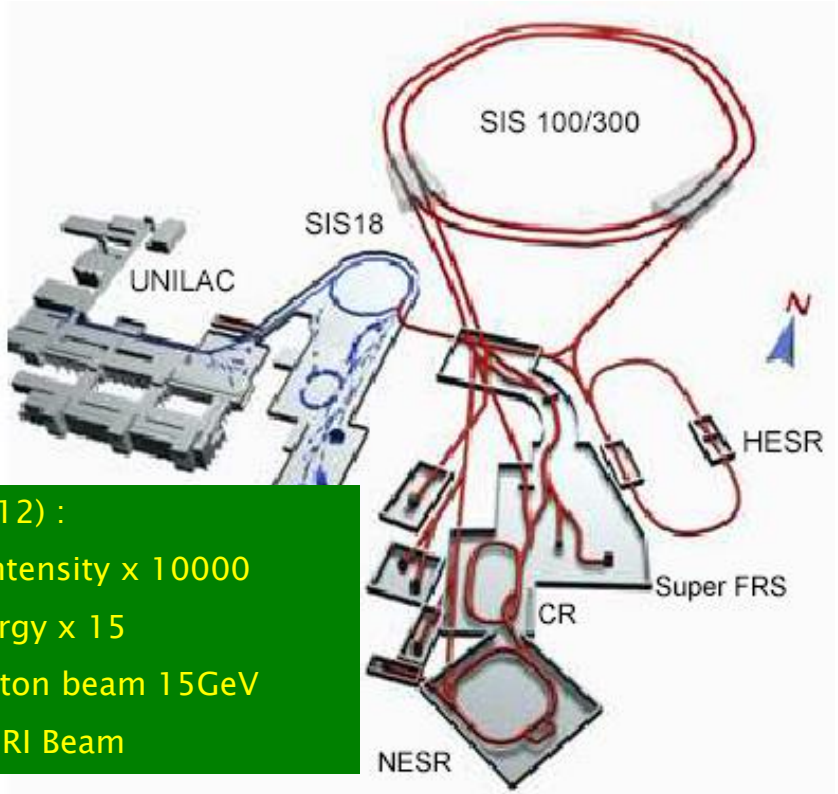
Rudolf LEY, PS Division, CERN, 02.09.96
Revised and adapted by Antonella Del Rosso, ETT Div.,
in collaboration with B. Desforges, SL Div., and
D. Manglunki, PS Div. CERN, 23.05.01

Acceleraters – Labs : GSI

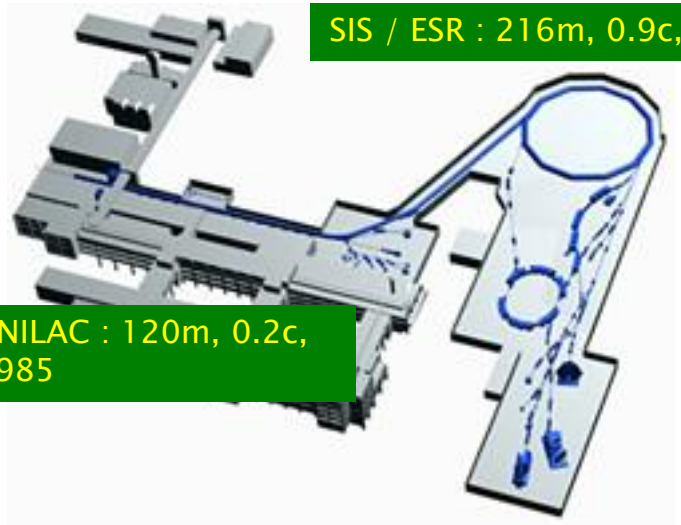


Gesellschaft für SchwerIonenforschung

Since 1954



SIS / ESR : 216m, 0.9c, 1993



UNILAC : 120m, 0.2c, 1985

FAIR (2012) :

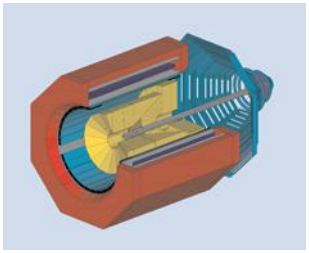
-Beam Intensity x 10000

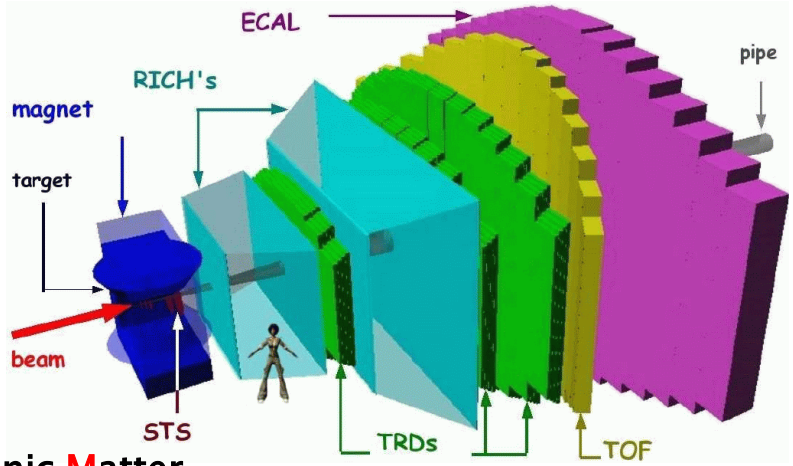
-Ion Energy x 15

-Antiproton beam 15GeV

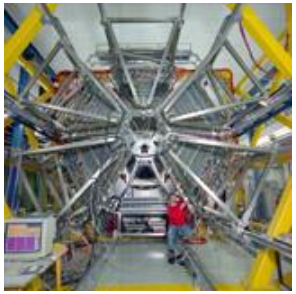
-Cooled RI Beam

Experiments @ SIS, FAIR.GSI

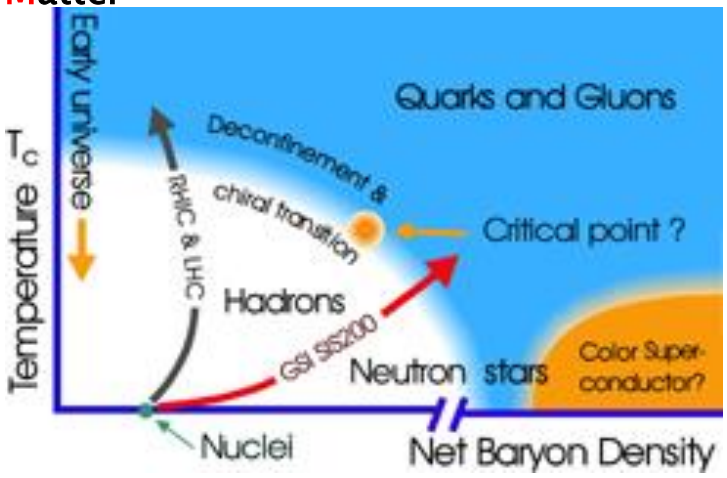




HADES

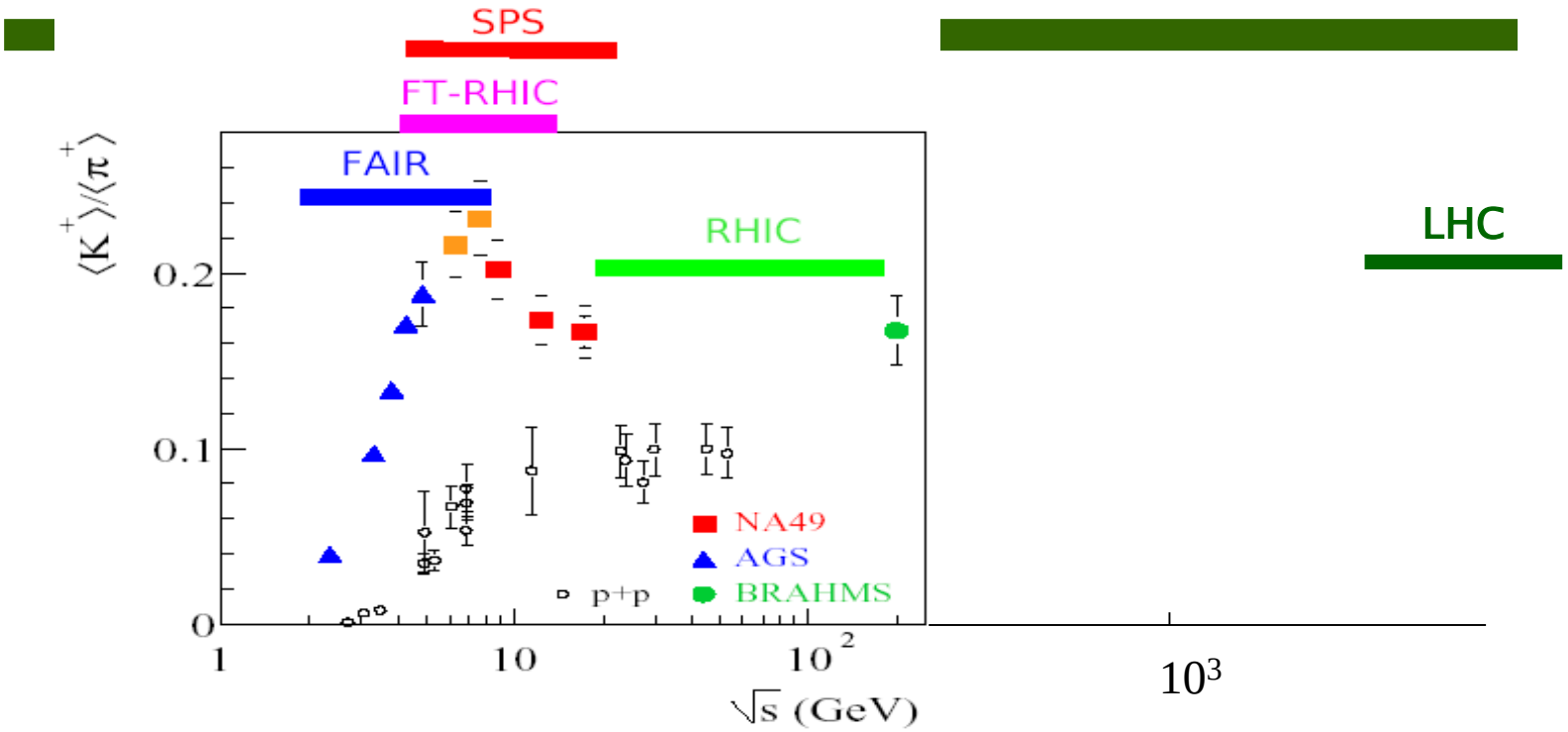


Compressed Baryonic Matter



KAOS

Possible experimental landscape



SPS ERA

LHC ERA

1990 2000 2010 2020 2030

AGS ERA

RHIC ERA

K O R A C ?

FAIR ERA

Check List for the HIM

- ✓ What do we want to measure ? (Physics Motivation) : Theoretical Study
- ✓ How and where can we measure it ? (Realization) : Experimental Study
- ✓ Our Capability
  - Funding – Request, Management (short term)
  - Manpower – Education (long term)

    → They are only MATERIALs !

  - Fundamental Structure (long term)
  - Infra Structure bet. Working groups (upto us!)

    → We need the Construction !!!

- ✓ Reasonable time schedule
  - Experimental Phase
  - Time vs. Output
- ✓ Long-term Plan (Step-by-Step) ?
- ✓ For the next generation ? Accelerator Complex (20-30 Y) ?

HIM Outline (Suggestion)

- Physics Motivation : Focused Session
- RHIC : PHENIX, STAR, FT-RHIC
- FAIR : CBM
- LHC : ALICE
- KORAC : ?