Study for the high-density matter at J-PARC Heavy-Ion Project

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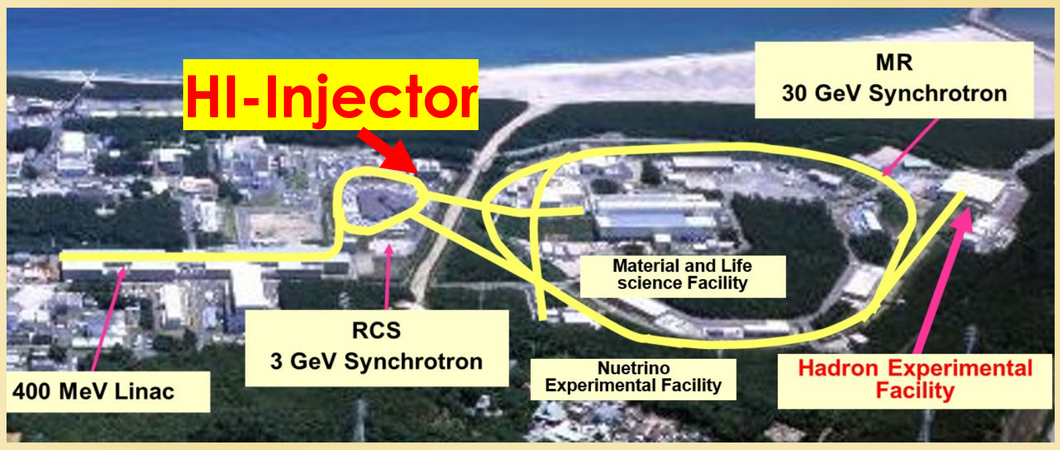
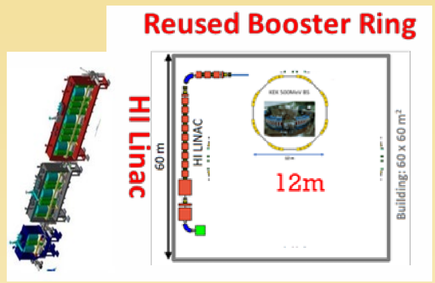
Japan Proton Accelerator Research Complex(J-PARC)



High-intensinty Proton accelalator
+ **Heavy Ion Injector**

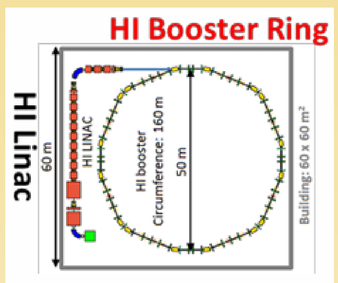
HI-Injector

1st PHASE

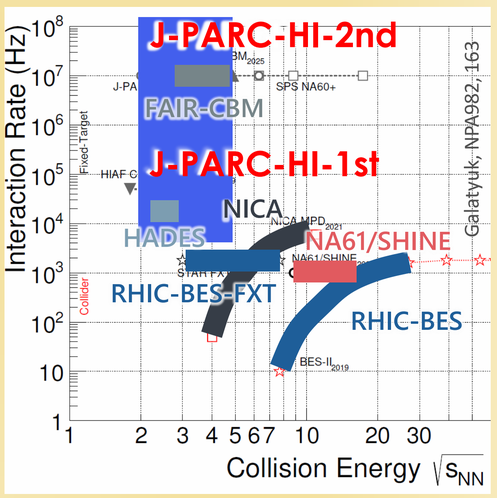


$\sim 10^{8}$/spill

2nd PHASE



$\sim 10^{11}$/spill

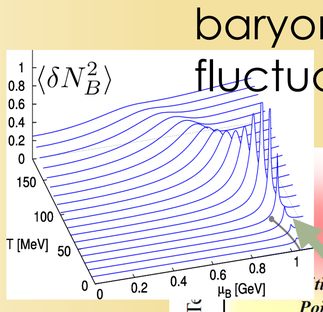


E_{lab} = 1-12AGeV

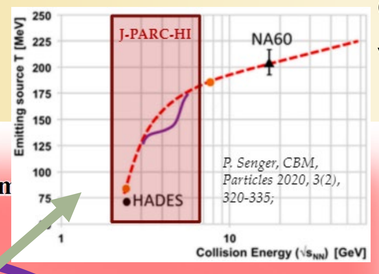
Physics Motivation

- 1st order phase transition
- EOS and/or hadron interaction at high desity
- Color super conductivity

baryon number fluctuation

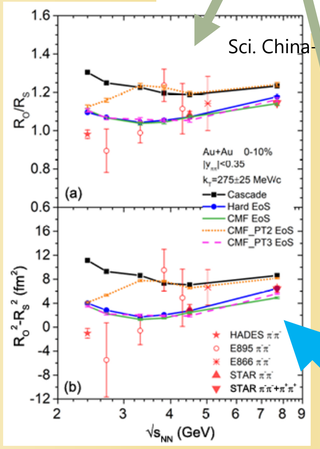


caloric curve via dilepton



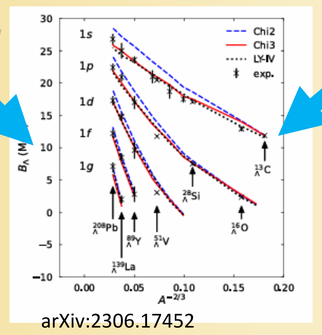
LM(M∼0) dielectron enhancement

Sci. China-Phys. M. A. 66, 232011

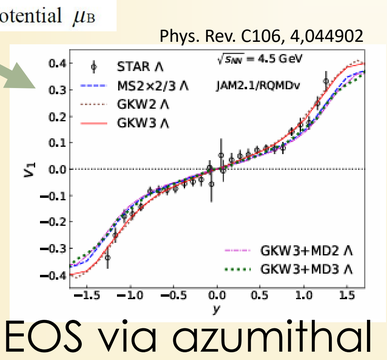


EOS via 2-particle correlation
(the correlation may be sesnsitve for high density. Hadron interection study is also intresteresting!!)

Complementary to "J-PARC Hadron Hall Extenstion program"!



arXiv:2306.17452



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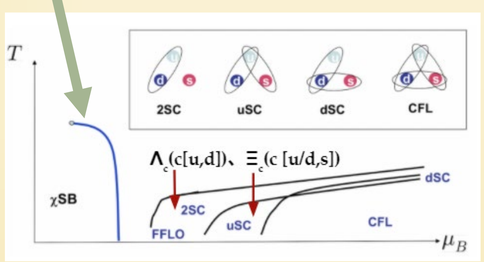
EOS via azumithal angle aisotropy

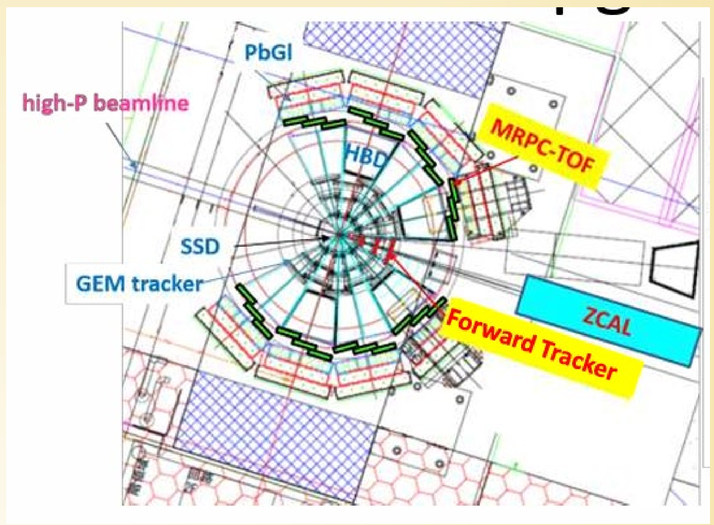


CSC diquark composition

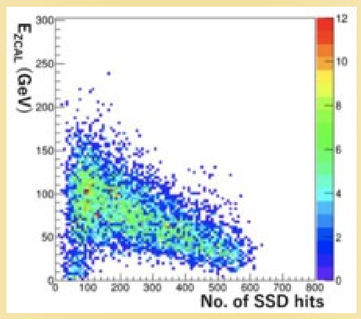
(T.Nishimura's talk) ptep 93D02

1st PHASE

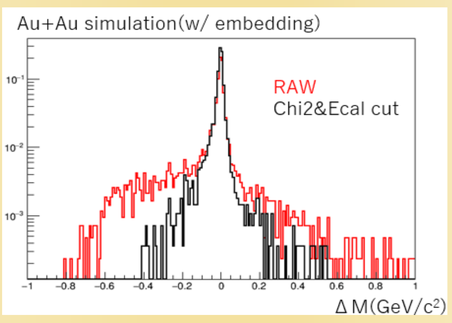
Based on J-PARC E16 spectrometer
(see T.Murakami's poster)



Event carachrization



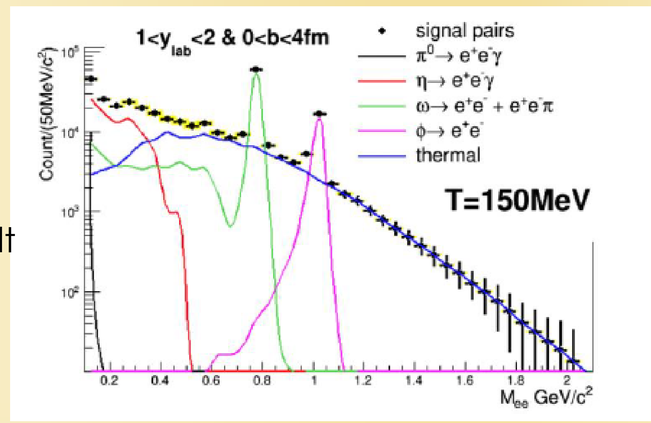
Track reconstruction simulation



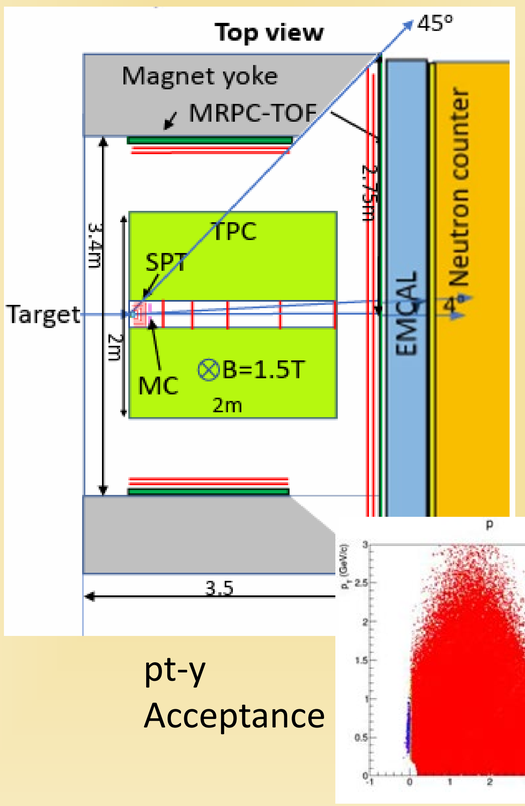
Forward modules will be upgraded to cope with the high multiplicity

- Tracking device
(STS-SSD)+3x(GEM Tracker)→2x(STS-SSD)+2x(GEM Tracker)
- Particle ID devices
(LG →fine segmented Lead Tangsten EM) + MRPC-TOF
- Centrality and Reaction plane device
60-sengmented W-MPPA ZDC
- Readout and DAQ system

Expected result of e^+e^- mass spectra for 100days run



2nd PHASE

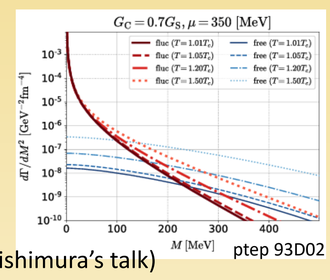


pt-y Acceptance

Fluctuation, flow, multi-strangeness and LM dielectron
→Wide range & uniform acceptance

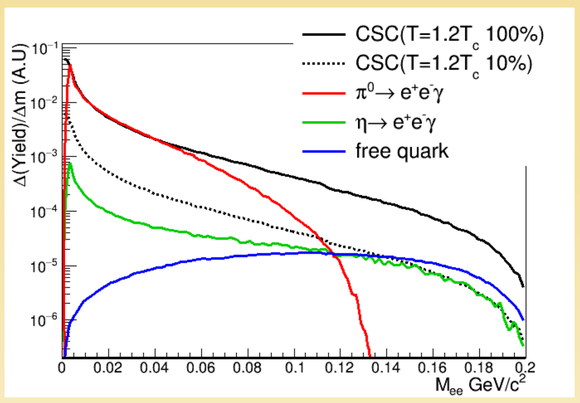
- Identified charged particles for ~4π acceptance
  - Silicon Pixel Tracker (SPT) ($\theta < 4^\circ$)
  - TPC ($\theta > 4^\circ$)
  - MRPC-TOF for particle identifications
- Trigger-less DAQ

Yield of "free quark contribution" was normlized to one of thermal contribution. Possible analysis cut (phase space & eeγ reconstruction) was applied.



(T.Nishimura's talk) ptep 93D02

Rough estimation of e^+e^- yield due to the CSC precursor.



Sweeping magnet &collimator
→Hyper nucleus Factory
Full intensity at J-PARC can be utizied
Exotics also can be searched