A new experiment of di-electron measurements at the 1st stage of J-PARC Heavy-Ion Project
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1st stage J-PARC Heavy Ion Project (J-PARC-HI)

J-PARC acceleration scheme has been established for high intensity proton beam.
- HI injector is necessary
- Reuse of KEK-PS Booster for the 1st stage.

1-12AGeV, 1x10^8 acceleration

Full spec J-PARC-HI is presented by H.Sako 4/8 poster T15-1
A new Experiment at 1st stage J-PARC-HI

Upgrading J-PARC E16 spectrometer for mid-rapidity di-electron

- Upgrading granularity of forward modules to handle high-multiplicity.
- Install detectors downstream to characterize collision geometry.
  → Zero degree hadron calorimeter (W-MPPA fiber) + reaction plane detector (Pb-Scnti)
- Upgrading DAQ for \( \sim 50\text{kHz} \) interaction rate.
  → Optimizing APV configuration or free streaming data taking.
Current open question is the existence of 1\textsuperscript{st} phase transition at high-density.

→ identification of laten heat with EM probe is the strong evidence of the 1\textsuperscript{st} PT
  • “Caloric curve” via di-electron with intermediate mass (mass and/or \(P_T\) slope).
  • “Long life time” due to the laten heat via di-electron yield with low mass.

Mass modification of vector meson is also interesting.
Signal statistics & systematics was evaluated with event generator (JAM) & MC

Thermal yield::interpolation of data,  meson yield::JAM(almost $m_T$ scaling)
Full E16 acceptance & eID capability, inefficiency due to high multiplicity

- Reproducing background with 0.1% accuracy by event mixing & like-sign normalization
- $S/B$ is about $1 \sim 2\%$ at continuum region
Expected Result

Temperature will be measured with a good accuracy from mass slope at IM region
• about 10%(stat) accuracy in the case T=120-150MeV
About 20%(sys) accuracy for excess yield at LM region.

Summary

• J-PARC Heavy Ion Project is considered with the reuse of KEK-PS Booster. It will achieve $10^8$ ions per spill.
• Di-electron measurement with the upgraded E16 spectrometer will be the first experiment of J-PARC-HI.
• The experiment will measure the temperature of the fireball with the accuracy of $\sim 10\%$