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## A new experiment of di-electron measurements at the 1st stage of J-PARC Heavy-Ion Project.

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The purpose of J-PARC Heavy-Ion Project (J-PARC-HI) is to study very high-baryon density matter with a heavy ion beam of 1-12 AGeV. A new heavy-ion injector and a new booster are necessary for the heavy-ion acceleration at J-PARC. Reuse of the KEK 500-MeV booster proton synchrotron is planned at the first stage of J-PARC-HI. The beam intensity at the first stage is expected to achieve  $10^8$  Au ions per spill, which exceeds the beam intensity of the existing high-energy heavy-ion facilities.

We proposed a new experiment at the first stage of J-PARC-HI using the J-PARC E16 spectrometer with a moderate detector and DAQ upgrade. The goal of the new experiment is to search for the first-order phase transition to the deconfinement phase at extremely high baryon densities using a di-electron probe. One of the experimental clearest pieces of evidence for the first-order phase transition is an observation of a plateau structure in the “caloric curve”, which is the dependence of the temperature on the excitation energy of the system. The virtual photon with intermediate mass ( $1 < M_{ee} < 3 \text{ GeV}/c^2$ ) will provide information about the initial temperature of space-time evolution of the medium. The medium modification of vector mesons and the lifetime of the hot medium also can be studied from the di-electron spectra in this experiment.

In this poster, we will show the detailed plan of the experiment and discuss the experimental feasibility.

**Primary author:** Dr MORINO, Yuhei (KEK)

**Co-author:** FOR J-PARC HI COLLABORATION

**Presenter:** Dr MORINO, Yuhei (KEK)

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