Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

Unquenched Lattice QCD study of Λ(1405) TORU TAKAHASHI, Yukawa Institute for Theoretical Physics, M. OKA, TITech — Λ(1405) is regarded as one of the most interesting hadrons and attracting much interest from several view points. Especially, the structure of Λ(1405) remains mysterious. Whereas Λ(1405) is interpreted as a flavor-singlet three-quark state in quark models, Λ(1405) could be interpreted as a Kaon-nucleon molecule. Λ(1405) is then considered to be a bound-state of $\bar{K}$ and N with binding energy of 30 MeV, and this large binding energy implies strong attraction between $\bar{K}$ and N. Such strong attractive interactions predict a new type of hadronic matter. The property of Λ(1405) can be therefore an important clue to new paradigm in hadron physics. Lattice QCD calculations are powerful, and expected to cast light on the nature of Λ(1405). However, few detailed lattice QCD study on Λ(1405) have been done so far. We study properties of Λ(1405) with lattice QCD. We make use of the full-QCD gauge configurations generated by CP-PACS/PACS-CS collaboration. We construct correlation matrices from several independent "octet" and "singlet" operators, and diagonalize them so that we can investigate mass spectra in (J, I, S)=(1/2, 0, -1) channel as well as possible mixing between octet and singlet states, which has not been discussed yet in the context of lattice QCD studies. As a result, we found that the lowest (2nd-lowest) state in this channel is dominated by a flavor-singlet (flavor-octet) state. We also extract the $\bar{K}N$ and $\pi\Sigma$ components in each observed state.

Toru Takahashi
Yukawa Institute for Theoretical Physics, Kyoto University, Japan

Date submitted: 01 Jul 2009 Electronic form version 1.4