Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

K^-pp studied with Coupled-Channel Complex Scaling Method
AKINOBU DOTE, IPNS/KEK, TAKASHI INOUE, Univ. of Tsukuba — K^{bar} nuclei (nuclear system with anti-kaon) might have lots of interesting properties due to the strong $K^{bar}N$ attraction in s-wave isoscalar channel. Recently, people are focusing on the most essential K^{bar} nucleus "K^-pp". A variational calculation with an effective $K^{bar}N$ potential derived from chiral SU(3) theory, performed by one of authors (A. D.), concluded the shallow binding of K^-pp. (only 20 MeV) However, a Faddeev (AGS) calculation, also constrained by chiral SU(3) theory, reported 80 MeV binding energy. Such a large discrepancy is considered to be caused by the $\pi\Sigma N$ three-body dynamics. Since the $\pi\Sigma$ degree is not explicitly dealt with in the variational calculation and is incorporated in the effective $K^{bar}N$ potential, the $\pi\Sigma N$ three-body dynamics might be lack in the previous study. We will perform a coupled channel calculation treating the $\pi\Sigma N$ channel explicitly. Since the obtained K^-pp-$\pi\Sigma N$ coupled state is expected to appear above the $\pi\Sigma N$ threshold as a resonant state, we employ "Complex Scaling Method" (CSM) which has succeeded in the treatment of resonances in nuclear physics. Studying K^-pp with "***Coupled-Channel Complex Scaling Method***" using a reliable NN potential (Av18 potential) and theoretical/phenomenological $K^{bar}N$ potentials, we will report its binding energy and decay width. Then, analyzing the CSM wave function, detailed property of K^-pp will be investigated.

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Date submitted: 01 Jul 2009 Electronic form version 1.4