Abstract Submitted
for the HAW05 Meeting of
The American Physical Society

Alpha Condensed Structure of Resonance States of 12C YASURO FUNAKI, Dept. of Phys., Kyoto Univ., AKIHIRO TOHSAKI, Suzuki Corporation, HISASHI HORIUCHI, Dept. of Phys., Kyoto Univ., PETER SCHUCK, IPN, Orsay, GERD ROEPKE, FB Phys., Rostock Univ. — The states with $J^\pi = 0^+$, 2^+, and 4^+ of ^{12}C with excitation energies less than about 15 MeV are investigated with the alpha condensate wave function with spatial deformation and by using the method of ACCC (analytic continuation in the coupling constant) which is necessary for a proper treatment of resonance states. The calculated energy and width of the recently observed 2_2^+ state are found to be well reproduced. The obtained 2_2^+ wave function has a large overlap with a single condensate wave function of 3α gas-like structure. The density distribution is shown to be almost the same as that of the 0_2^+ state that is regarded as a 3α Bose- condensed state, if the energy of the 2_2^+ state is scaled down to the same value as the one of the 0_2^+ state. Furthermore, the kinetic energy, nuclear interaction energy, and Coulomb interaction energy of the calculated 2_2^+ state are shown to be very similar to those of the 0_2^+ state. It is also shown that the 2_2^+ state is obtained by promoting just one alpha cluster out of the condensate of the 0_2^+ state into a D-wave. We conclude that the 2_2^+ state has a structure similar to the 0_2^+ state of Bose-condensate character with a dilute 3α gas-like structure[1].
[1] Y. Funaki, A. Tohsaki, H. Horuichi, P. Schuck, and G. Röpke, Euro. Phys. J. A, Vol. 24, No. 3 (2005), pp. 321 - 344.

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Date submitted: 16 May 2005 Electronic form version 1.4