Reaction Mechanism of ^{12}C(e, e'p) Reaction at Low Momentum Transfer

T. Tamae [a], Y. Sato[a], T. Yokokawa[a], Y. Asano[a], M. Kawabata[a], O. Konno[c], I. Nakagawa[d], I. Nishikawa[a], K. Hirota[a], H. Yamazaki[a], R. Kimura[b], H. Miyase[b], H. Tsubota[b]

[a] *Laboratory of Nuclear Science, Mikamine, Taihaku, Sendai 982-0826, Japan*

[b] *Graduate School of Science, Tohoku University, Aramaki, Aoba, Sendai 980-8578, Japan*

[c] *Ichinoseki National College of Technology, Hagiso, Ichinoseki 021-8511, Japan*

[d] *Laboratory of Nuclear Science, MIT, Cambridge, MA 02139, USA*

! !! ! The reaction mechanism of the (γ, p) reaction still remains a subject of discussion. There exists a significant discrepancy between the calculated cross sections obtained in non-relativistic and relativistic approaches. In order to study the problem, we measured the (e, e'p_0) cross section of ^{12}C in a kinematical condition close to the (γ, p) reaction: an energy transfer of 60 MeV and a momentum transfer of 104.1 MeV/c. The reduced cross section at missing momenta between 181.3 and 321.2 MeV/c obtained from the experiment is compared with a distorted wave impulse approximation (DWIA) in reasonable agreement (Fig. 1). This result demonstrates a high reliability of the DWIA calculation in this energy region, and supports the discussion that a large difference between the experimental data and the DWIA calculation in the (γ, p_0) reaction is related to non-nucleonic degrees-of-freedom such as meson exchange currents. The present result should be compared also with relativistic calculations.

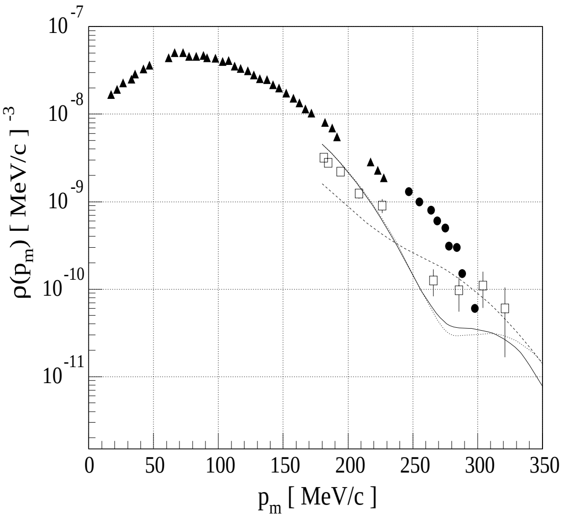

Figure 1: Reduced cross section of ^{12}C(e, e'p_0) and (γ, p_0) reactions. Closed triangles represent the data of the quasi-elastic (e, e'p_0) reaction. Closed circles are data from (γ, p_0) reaction. Open squares show the results of the present (e, e'p_0) experiment, and lines are results of the DWIA calculation corresponding to the present kinematics.