（ ※本報告書は英語で記述してください。ただし、産業利用課題として採択されている方は日本語で記述していただいても結構です。 ）

CROSS TOKAI **Experimental Report** J-PARC	承認日 Date of Approval 2017/5/27 承認者 Approver Ryoichi Kajimoto 提出日 Date of Report 2017/5/25
課題番号 Project No.2016B0039 実験課題名 Title of experiment Observation of strong d-f hybridization effect in Y_0.95Pr_0.05CoO_3 via crystalline-electric-field excitations 実験責任者名 Name of principal investigator Yoshihiko Kobayashi 所属 Affiliation Tokyo Medical University	装置責任者 Name of responsible person Ryoichi Kajimoto/Kazuya Kamazawa 装置名 Name of Instrument/(BL No.) BL-01 実施日 Date of Experiment 2017/3/27-3/30

試料、実験方法、利用の結果得られた主なデータ、考察、結論等を、記述して下さい。（適宜、図表添付のこと）
Please report your samples, experimental method and results, discussion and conclusions. Please add figures and tables for better explanation.

1. 試料 Name of sample(s) and chemical formula, or compositions including physical form.

Pr_0.05Y_0.95CoO_3 and YCoO_3 polycrystalline samples

,

2. 実験方法及び結果（実験がうまくいかなかった場合、その理由を記述してください。）
Experimental method and results. If you failed to conduct experiment as planned, please describe reasons.

In order to clarify the microscopic Pr(4f) electronic state in perovskite cobaltite Pr_1-xY_xCoO_3, where the change of the 4f-ground state from nonmagnetic Pr(4f^2) to magnetic Pr(4f^1) associated with the Pr(4f)-O(2p)-Co(3d) hybridization effect, we have conducted the measurements of crystalline-electric-field (CEF) excitations by the inelastic neutron scattering on Pr_1-xY_xCoO_3 (x = 0.95), along with the measurement on YCoO_3 as a reference.

Experimental method:

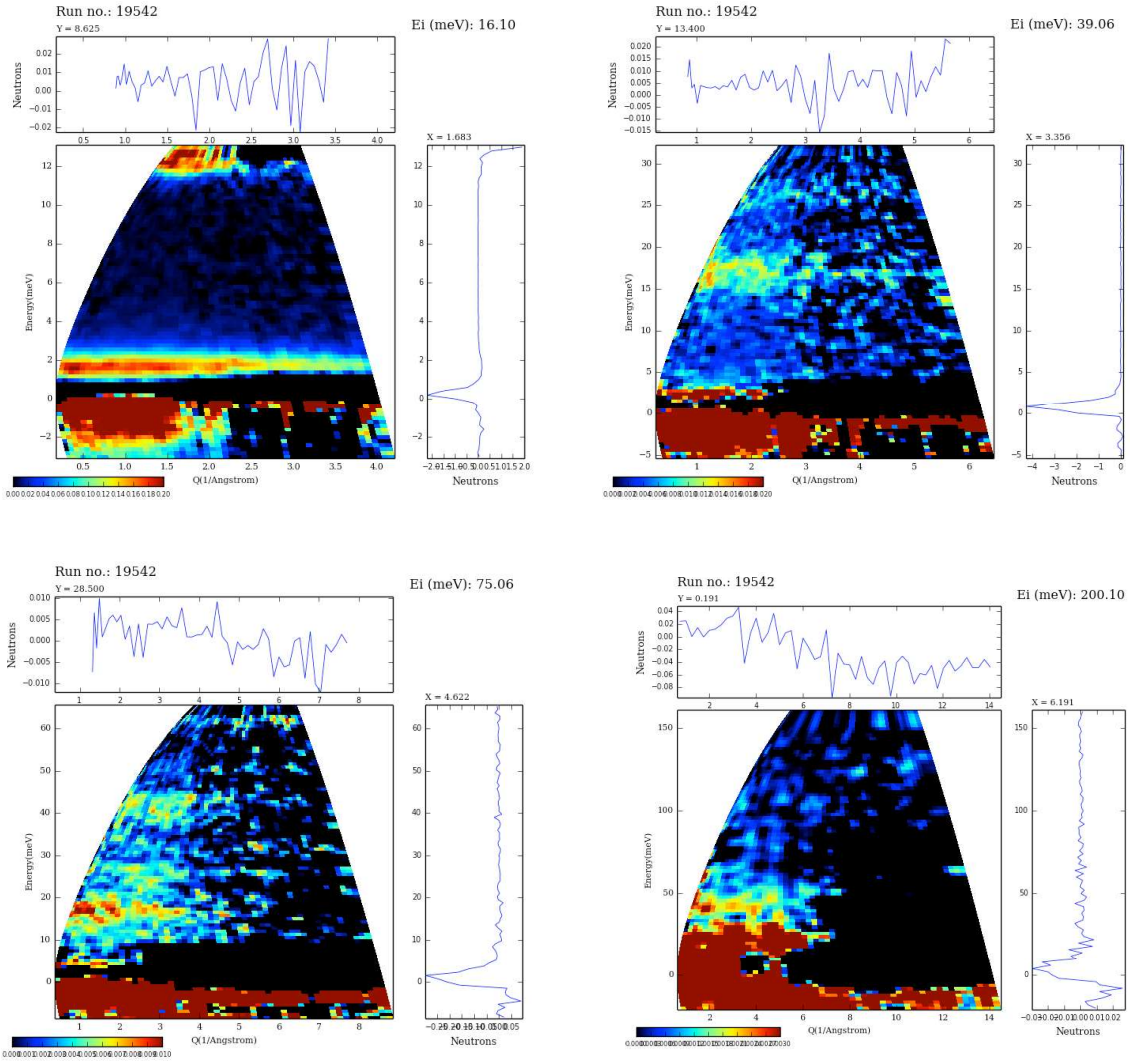
The experimental condition of the inelastic neutron scattering measurements are as follows; radial collimator, Ei = 200 meV, chopper: f = 300 Hz, temperature: between 6.5 and 300 K.

First, we measured the inelastic neutron scattering spectra for Pr_0.05Y_0.95CoO_3. Then the measurement on YCoO_3 reference was conducted. The difference spectra were obtained by subtracting the spectra for YCoO_3 from those for Pr_0.05Y_0.95CoO_3 in order to extract the contribution from dilute Pr ions.

2. 実験方法及び結果（つづき） Experimental method and results (continued)

Experimental results:

The preliminary results of the difference spectra at 100 K show several peaks almost independent of the scattering vector Q, which suggest CEF excitation spectra (see figs.).



At about 10K, additional excitation peaks were observed, showing that their intensity strongly decreases with increasing temperature. According to the number of the CEF spectra, the valence state of Pr seems to be trivalent (4f^2, multiplicity 9) rather than divalent (4f^1, multiplicity 6). The results of the present experiment along with the previous magnetization measurements suggest that the Pr(4f^2) state changes from nonmagnetic ground state into magnetic one due to the strong hybridization between O(2p) states. The precise extraction of the difference inelastic neutron scattering spectra and the CEF analysis to obtain the Pr(4f^2) wave functions are underway.