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Correlation between spin helicity and electric polarization vector in quantum chain magnet LiCu_2O_2 SHINICHIRO SEKI, YUICHI YAMASAKI, YOSHINORI TOKURA¹, Department of Applied Physics, University of Tokyo, MINORU SODA, MASATO MATSUURA, KAZUMA HIROTA, The Institute for Solid State Physics, University of Tokyo — Measurements of polarized neutron scattering were performed on the multiferroic quantum chain magnet LiCu_2O_2 . In the ferroelectric ground phase, the existence of transverse spiral spin component in the bc -plane was confirmed. When the direction of electric polarization is reversed, the vector spin chirality as defined as $\mathbf{C}_{ij} = \mathbf{S}_i \times \mathbf{S}_j$ is also reversed. This directly proves that the spin-current model $\mathbf{P}_{ij} \propto \mathbf{e}_{ij} \times \mathbf{C}_{ij}$ is applicable even to this e_g -electron quantum $S=1/2$ system. Differential scattering intensity of polarized neutrons shows a large discrepancy from that expected for the classical bc -cycloidal spin structure, implying either the complexity of magnetic structure or the effect of quantum fluctuation.

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