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Inelastic neutron scattering study and magnetic excitations on the low-dimensional antiferromagnet $\alpha-\mathbf{Cu_2V_2O_7}$ GANATEE GITGEATPONG, Mahidol University, YANG ZHAO, University of Maryland, YIMING QIU, NIST Center for Neutron Research, KITTIWIT MATAN, Mahidol University — Magnetic excitations of the low-dimensional antiferromagnet $\alpha-Cu_2V_2O_7$ have been investigated using inelastic neutron scattering. The study reveals unusual commensurate splitting of magnetic excitation branches centered at a wave vector (0, $\pm\delta$, 0) with $\delta = 0.25$ away from a magnetic zone center, where a magnetic Bragg peak is observed. The energy gap of 0.75 meV at (0, $\pm\delta$, 0) was found to decrease as a function of temperature and the magnetic excitations become diffusive and disappear above 35 K coincident with $T_N = 33.4$ K. A recent experiment at the Multi Axis Crystal Spectrometer, MACS, to map the excitations over a large momentum space clearly shows the splitting of the dispersion at most of the allowed magnetic reflections. This commensurate splitting of the spin-wave-type excitations without the magnetic Bragg reflections at the same commensurate wave vectors has not yet been previously observed and remains unexplained. In the presentation, the experimental data will be shown and the possible explanation will also be discussed.

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