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Spin waves in $LiCu_2O_2$ and $NaCu_2O_2$: far-infrared study in magnetic field. T. ROOM, D. HUVONEN, U. NAGEL, NICPB, Tallinn, Estonia, Y.J. CHOI, C.L. ZHANG, S. PARK, S.-W. CHEONG, Dept. of Physics & Astronomy and Rutgers Center for Emergent Materials, Rutgers Uni., M. MOSTOVOY, Materials Science Center, Uni. of Groningen, The Netherlands — Frustrated magnetic interactions influence the ground state properties of spin systems. They may drive spin chain systems into a helicoidally ordered phase. Excitations in the helicoidally ordered phase are gapless spin waves. Anisotropic interactions create a finite gap at zero wave vector, $\boldsymbol{q} = 0$. $LiCu_2O_2$ and $NaCu_2O_2$ are quasi-1D systems with a weak interaction between Cu^{2+} spin chains. Both compounds enter spin spiral state at low temperature ($LiCu_2O_2$ at 24K and $NaCu_2O_2$ at 12K). Here we report results of far-infrared (FIR) study where the absorption of light from 3 to 100cm^{-1} by spin waves in $LiCu_2O_2$ and $NaCu_2O_2$ is measured. Light is absorbed by magnetic excitations at $\boldsymbol{q} = 0$ and at wave vectors that are multiples of the spiral wave vector, $\pm n\boldsymbol{Q}$. In magnets with a noncollinear spin ordering, such as a spin spiral, both components of light, magnetic and electric, may induce optical transitions. Measurements were performed from 3K to 30K and in fields up to 12T. To elucidate the selection rules, polarized light and different sample geometries were used. The magnetic field dependence of line positions and intensities is analyzed within a continuum model of a spiral magnet.

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