Magnetic Phase Diagram of Co$_3$V$_2$O$_8$ FEI YEN, BERND LORENZ, Y. Q. WANG, Y. Y. SUN, C. W. CHU$^1$, University of Houston/TCSUH — Kagomé-staircase lattice structures like Ni$_3$V$_2$O$_8$ and Co$_3$V$_2$O$_8$ have recently attracted attention because of their complex magnetic phase diagrams and the magnetically induced ferroelectric (FE) phase observed in Ni$_3$V$_2$O$_8$. Co$_3$V$_2$O$_8$ at zero magnetic field exhibits five subsequent magnetic phase transition in a narrow temperature range. It has an incommensurate antiferromagnetic phase below $T_N=11.4$ K and weak ferromagnetic behavior along the a-axis at $T_C=6.2$ K. Along with three other phase transitions in between; $T_1=8.9$ K, $T_2=7.0$ K and $T_3=6.9$ K, the evolution of these five phase transitions under magnetic field, phase boundaries, is traced through magnetic susceptibility and dielectric constant anomalies. We resolve the complete magnetic phase diagram of Co$_3$V$_2$O$_8$ with the magnetic field applied along the principal crystallographic orientations.

$^1$Lawrence Berkely National Laboratory, Hong Kong University of Science and Technology

Fei Yen
University of Houston/TCSUH

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