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**Magnetic Phase Diagram of  $\text{Co}_3\text{V}_2\text{O}_8$**  FEI YEN, BERND LORENZ, Y. Q. WANG, Y. Y. SUN, C. W. CHU<sup>1</sup>, University of Houston/TCSUH — Kagomé-staircase lattice structures like  $\text{Ni}_3\text{V}_2\text{O}_8$  and  $\text{Co}_3\text{V}_2\text{O}_8$  have recently attracted attention because of their complex magnetic phase diagrams and the magnetically induced ferroelectric (FE) phase observed in  $\text{Ni}_3\text{V}_2\text{O}_8$ .  $\text{Co}_3\text{V}_2\text{O}_8$  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  $\text{Co}_3\text{V}_2\text{O}_8$  with the magnetic field applied along the principal crystallographic orientations.

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