Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

**Temperature- and field dependent Raman spectra of the single-molecule magnet $Mn_{12}$-acetate.** ROBERT FURSTENBERG, CHRISTOPHER A. KENDZIORA, U.S. Naval Research Laboratory, JAVIER MACOSSAY, University of Texas - Pan American — $Mn_{12}$-acetate and related single-molecule magnets are promising candidates for high-density magnetic storage devices, spintronics components and even quantum computing applications. However, certain aspects of their fundamental properties are still not completely understood. For example, the importance of spin-vibron interactions in the calculation of the magnetic anisotropy of $Mn_{12}$_acetate has been proposed a few years ago [1]. Some experimental evidence has already been provided [2]. We present further evidence in support of this theory. A detailed Raman scattering study was performed by measuring polarization-dependent spectra in the 35-1500cm$^{-1}$ frequency region, temperature range of 6-300K and in magnetic fields of up to 9T. A symmetry analysis of the vibrational modes revealed the presence of acetic acid disorder-related isomers with $C_1$ symmetry. This confirms an earlier low-temperature X-ray study [3]. The observed temperature dependence of vibrational modes was interpreted in terms of spin-vibron interactions. The influence of external magnetic field on Raman spectra will also be discussed. [1] M. Pederson et al., *Phys. Rev. Lett.* 89, 097202 (2002); [2] A.B. Shushkov et al., *Phys. Rev.* B 66, 144430 (2002); [3] Cornia et al., *Acta Crystallogr., Sect. C: Cryst. Struct. Commun.,* 58, 371 (2002)

Robert Furstenberg
U.S. Naval Research Laboratory

Date submitted: 27 Nov 2007