Powder neutron diffraction and resonant x-ray scattering measurements from a single crystal have been performed to study the low-temperature state of the 2D frustrated, quantum-Heisenberg system Li_2VOSiO_4. Both techniques indicate a collinear antiferromagnetic ground state, with propagation vector $k = (½, ½, 0)$, and magnetic moments in the a-b plane. Contrary to previous reports, the ordered moment at 1.44 K, $m = 0.63(3)\ \mu_B$, is very close to the value expected for the square lattice Heisenberg model ($\sim 0.6\ \mu_B$). The magnetic order is three dimensional, with antiferromagnetic a-b layers stacked ferromagnetically along the c axis. Neither x-ray nor neutron diffraction shows evidence for a structural distortion between 1.6 and 10 K.

The experiment was performed in the horizontal geometry, which implies incident photons with polarization parallel to the scattering plane (π). The first part of the experiment was dedicated to the search of structural distortions with a better resolution ($\Delta d/d = 0.005$) than that allowed by powder neutron diffraction. The second part of the experiment was performed around the V absorption K edge (5.465 keV), to measure the temperature dependence of the magnetic signal. A pyrolitic graphite (004) reflection was used to analyse whether the polarization of the scattered beam was parallel or perpendicular to the scattering plane. RXS allows us to distinguish between the collinear and the noncollinear structures compatible with neutron powder-diffraction results and to probe directly the dimensionality of the magnetic structure. The results obtained by this experiment have been published by A. Bombardi et al. in PRL 93, 027202 (2004).

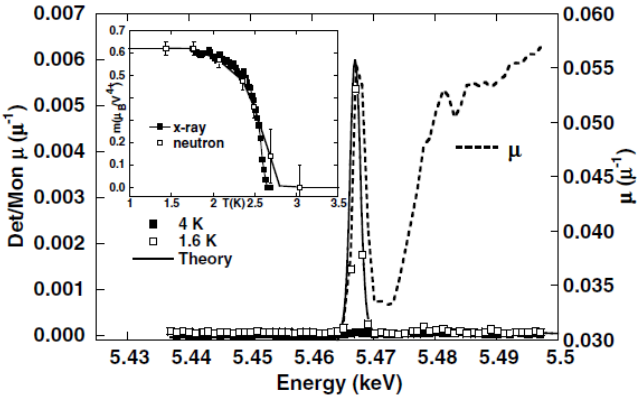

FIG. 3. Photon-energy dependence around the V K-absorption edge of the intensity of the $(\frac{1}{2}\ \frac{1}{2}\ 3)$ superlattice magnetic reflection. Data were collected in the rotated channel π-σ, above (open squares) and below (closed squares) the Néel temperature. Corrections for self-absorption have been applied. The fluorescence yield is shown by the broken line. The inset shows the temperature dependence of the ordered magnetic moment, m, as determined by neutron diffraction compared with the square root of the x-ray integrated intensity, after normalization at 1.44 K. The difference in the T_N has to be ascribed to the heat load on the sample.

A. Bombardi et al., PRL **93**, 027202 (2004).