## Light on Phase IV in Ce<sub>0.7</sub>La<sub>0.3</sub>B<sub>6</sub>

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The  $\Gamma_8$  ground state of CeB<sub>6</sub>, which may support, dipole, quadrupole and octupole moments, is responsible for its complex low temperature phase diagram. On cooling from the paramagnetic phase (Phase I), antiferroquadrupole (AFQ) order occurs below  $T_Q$ =3.3K (Phase II). Upon further cooling, antiferromagnetic order (AFM) additionally sets in below  $T_N$ =2.2K (Phase III). The substitution La ions for Ce, gives rise to a recently discovered new phase (Phase IV) in Ce<sub>x</sub>La<sub>1-x</sub>B<sub>6</sub>. For x~0.7, the ground state condenses from the paramagnetic phase into phase IV, below  $T_{IV}$ =1.5K. However, since its discovery, the nature of phase IV has confounded researchers, because the various experimental results are irreconcilable with either AFQ or AFM order [1].

We report on new resonant X-ray scattering (RXS) studies of phase IV, taken at the XMaS beamline of the ESRF. The E2 RXS cross-section can be expressed as a multipole expansion sensitive to dipole, quadrupole, octupole and hexadecapole moments [2]. From our investigation, we have discovered an E2 RXS feature, for which the azimuth dependence can be reconciled with an ordered octupole moment in phase IV. The results give, to our knowledge, the first direct evidence for a new order parameter in the  $Ce_{0.7}La_{0.3}B_6$  ground.

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Hill J.P., McMorrow D.F., Acta. Cryst., 1996, A52, 236.

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