

# *Orbital ordering in actinide oxides*

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Orbital ordering occurs when long-range order of anisotropic charge distributions develops in a material. This has been well studied in the 3d manganites [1], and has been observed already in UPd<sub>3</sub> [2]. Neutron diffraction is not sensitive to such effects, but resonance x-ray scattering (RXS) at the actinide M<sub>4</sub>-edge energies, combined with an analysis of the outgoing polarization as a function of the azimuthal angle, is particularly powerful. We report here experiments on the oxides UO<sub>2</sub> [3] and NpO<sub>2</sub> [4], as well as a mixed (U,Np)O<sub>2</sub> system [5]. There is a change in the nature of the orbital ordering between UO<sub>2</sub> and NpO<sub>2</sub> leading to probable frustration in the orbital state in certain solid solutions.

1: S. B. Wilkins *et al.*, PRL **91** (2003) 167205

2: D. McMorrow *et al.*, PRL **87** (2001) 057201

3: S. B. Wilkins *et al.*, submitted to *Europhysics Letters*

4: J. A. Paixão *et al.*, PRL **89** (2002) 187202

5: S. B. Wilkins *et al.* PR B **70** (2004) 214402