

**Directional imprinting of structural distortions
drives spin-orbital order in a vanadate**

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The flexible perovskite structure of many transition metal oxides allows different compounds to be combined in atomically sharp epitaxial heterostructures. Targeted manipulation of the different quantum phases by electronic and magnetic reconstruction at the interfaces between two compounds can lead to the realisation of new functionalities. Due to the strong coupling of the electronic degrees of freedom to the lattice, structural changes are equally influential. Small shifts in the oxygen positions can significantly alter the macroscopic properties. An example of this is our study of YVO₃ epitaxial films on different substrate facets [1]. The difference in the direction of the displacements induced in YVO₃ films grown on orthorhombic (110) and (001) facets of YAlO₃ substrates alone leads to the stabilisation of different spin-orbitally ordered phases.

References:

[1] P. Radhakrishnan *et al.*, Nature Physics **21**, 126–131 (2025)