Oxide interfaces: a versatile platform for material design and ultrafast light control

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Exerting control over quantum materials is one of the main goals in condensed matter physics. Oxide interfaces have emerged as a versatile platform for material design, where new fundamental properties can be controlled by assembling condensed matter at the atomic scale.

Light plays a pivotal role in this scientific exploration. Probing materials with light reveals the collective excitations and the energy landscapes that underpin correlated dynamics. Recently we have come to the realisation that light not only reveals the organisation of condensed matter, it can also unlock new properties and promote phase transitions.

The overarching goal of the field is to control macroscopic material properties, paving the way to new scientific insights and future emerging technologies. We will review recent progress in the field of material design at oxide interfaces, focusing on the control of quantum phases in and out of equilibrium.