Contribution ID: **22** Type: **Invited Oral**

Signatures of surface spin-orbital chiral metal

Surface experimental probes, such as angle-resolved photoelectron spectroscopy provide researchers access to the electronic structure of solids. Despite the advances in the field, recently, new forms of surface local magnetism completely different from standard descriptions have appeared. One example of such forms of magnetism are the one generated by the so-called loop currents, generated by the collective motion of electrons in solids.

Such currents are of paramount importance and their manifestation is tightly connected to the symmetries of a material. For example, if they involve the orbital and angular momentum, then there will be asymmetries upon mirror operator which will affect the orbital-and-angular momentum conservation. While this phenomenology can be often elucidated by muon spectroscopy in bulk systems, surface and interface effects remain elusive.

Here, I aim to give an overview of a new powerful methodology, based on the combination of circular dichroism and spin-resolved photoelectron spectroscopy, to uncover such elusive phases. I will do this starting from simple concepts and showing, at the end, my current research. In particular, I will show a new methodology able to access what is known as loop current, even if the latter manifest at the surface of a certain material. I will use as a prototype material Sr2RuO4, and find out that the signal collected is compatible with that of a surface spin-spin orbital chiral metal.

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