Scientists working in part at NSLS have learned important information about a new state of matter called a topological insulator (TI). TIs may be very useful in spintronics and quantum computing technologies due to their unusual electronic and spin structures.

TIs are unique in that their interior, or bulk, is insulating while the surface of the material conducts. Furthermore, the surface electrons have a characteristic helical spin structure.

Using ultraviolet light, researchers investigated the electron spin structure of Bi$_2$Se$_3$, a model system for a TI surface. They confirmed a helical spin configuration and observed a nearly full spin polarization. This result greatly improves on previous findings, which yielded considerably lower spin polarizations, and affirm that Bi$_2$Se$_3$ is indeed a promising material for new technologies.

The findings also line up with theory, indicating that scientists' understanding of TIs is on track.


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