狮城新闻

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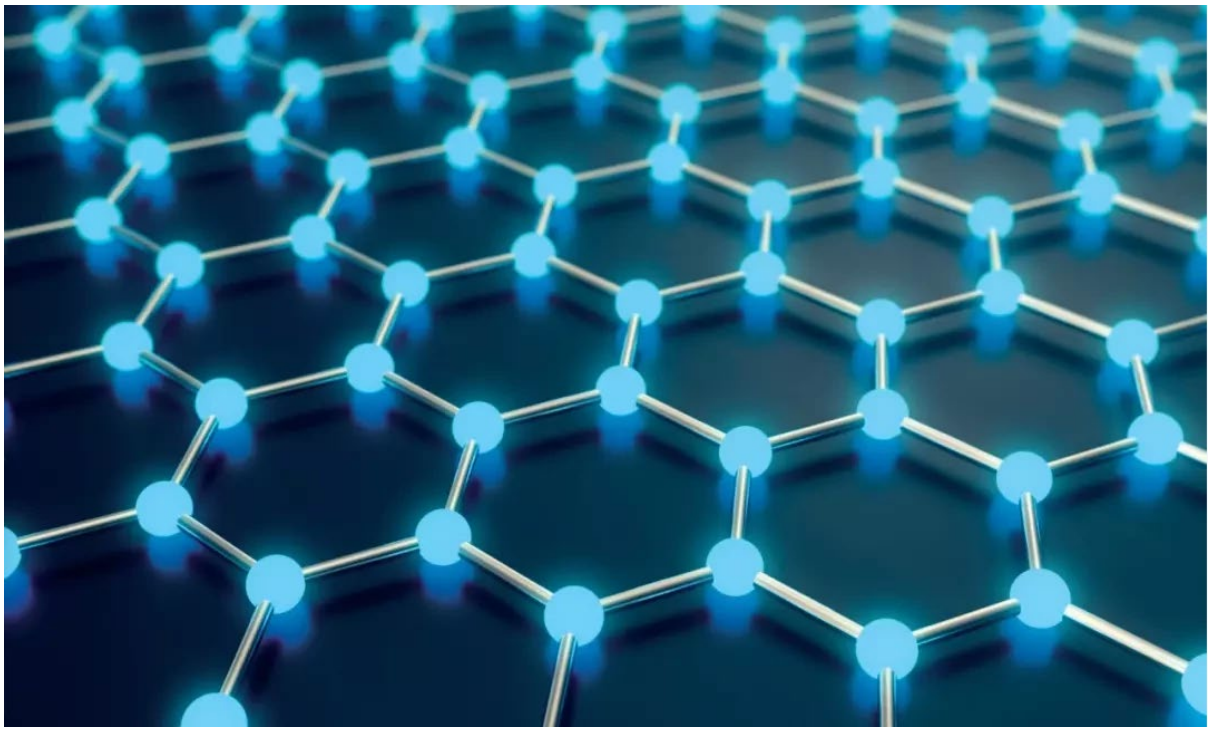
A breakthrough discovery by researchers at Nanyang Technological University (NTU) could lead to a new revolution in quantum materials, giving rise to new materials with desirable quantum properties. The discovery reveals the potential of van Hove singularities in topological materials, which are expected to exhibit extraordinary properties such as superconductivity in the future, providing unlimited possibilities for the development of cutting-edge technologies.

Van Hove singularities and the potential of quantum materials

Van Hove singularities refer to the interaction of electrons at a specific functional level.

When subatomic probes such as electrons are at this special level of functionality, they interact strongly with each other, giving the material extraordinary quantum properties.

This property enables the material to exhibit phenomena such as superconductivity at high temperatures, which will have a huge impact on future fields such as quantum computing and energy technology.



Unique properties of topological materials

Topological materials are a class of materials with special geometric structures. Their unique position allows electrons to flow only on the surface, rather than throughout the interior like traditional materials.

This makes topological materials a hot topic in quantum materials research. Despite the huge potential of topological materials, their quantum properties have been fully studied and explored.

The researchers' key findings

A study co-led by Assistant Professor Chang Guoqing from NTU's School of Physical and Mathematical Sciences has discovered two types of van Hove singularities in the topological materials rhodium monosilicide (RhSi) and cobalt monosilicide (CoSi).

These van Hove singularities are close to the Fermi level, indicating that the material has a good chance of achieving desirable quantum properties such as superconductivity and ferromagnetism.

The researchers also found that by adding metal atoms to the material, the energy levels of the Van Hove singularity can be tuned, opening up new directions for designing quantum materials with new properties.

Associate Professor Chang Guoqing said: "Our discovery opens the door to exploring more quantum materials with unique properties, potentially paving the way for technological breakthroughs in areas such as computing and energy."

The research results were published in Nature Physics (2023) under the title "Adjustable topologically driven Fermi arc van Hove singularities", DOI: 10.1038/s41567-022-01892-6.

https://www.shicheng.news/v/vvloZ#new