

Odd-frequency Cooper pairs and odd superconductivity



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Research Contents Physics of odd-frequency Cooper pairs

Superconductivity and Cooper Pairs

There are many things around us that work using electricity. Smartphones, game consoles, TVs, and refrigerators—all of them can be used because of electricity. However, when electricity flows, some energy is lost as heat because of something called electrical resistance. For example, when a computer or hair dryer gets hot, it's because the flowing electricity meets resistance, which creates heat.

But when a special phenomenon called superconductivity happens, electrical resistance becomes zero. In other words, electricity can flow without any waste, and the energy is not lost at all. It keeps flowing smoothly, forever. This is an amazing thing when using electricity.

Superconductivity occurs when certain special materials are cooled down to very low temperatures, such as minus 200 degrees Celsius. At such cold temperatures, the electrons—which usually move around separately—start to behave in a special way. This is where Cooper pairs come in.

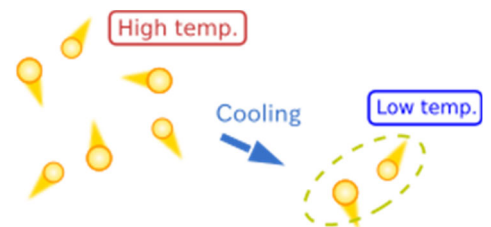
Normally, when electrons try to move in the same direction, they bump into each other or get caught on obstacles inside the material. This causes electrical resistance. But when superconductivity occurs, two electrons join together to form a pair, almost like one unit. This pair is called a Cooper pair.

Electrons in a Cooper pair help each other move smoothly without getting blocked. As a result, electrical resistance disappears, and electricity can flow without losing energy. This is how the strange and amazing phenomenon of superconductivity happens.

Superconductivity is already being used in our daily lives. For example, MRI machines in hospitals use powerful magnets that rely on superconductivity. Also, maglev trains (trains that float and run without touching the tracks) use superconducting technology. In the future, superconductivity is expected to help us send electricity without waste and build a more convenient and eco-friendly society.

In Conclusion

Superconductivity is a phenomenon where electrons work together and move without waste—it is a key to the future. By learning about Cooper pairs, the mysterious teamwork of electrons, the world of electricity becomes even more interesting. If you feel curious, try learning more about physics and science.



Available Facilities and Equipment
