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Exotic Properties of High Temperature Cuprates Superconductor

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In spite of much interest in various exotic properties of superconducting cuprates such as the pseudogap, strange metal in normal state, anomalies in the optical sum rules, and several exotic phases of the electron-nematic order *etc* [1], its microscopic mechanism still remains unsolved issues. Here these properties are considered using our recently proposed theory emphasizing that the electronic state of superconductors can be described by the composed fermions [2,3,4]. It is found that the anisotropic pseudogap can be derived from pseudogap state with the representation in momentum space, and that T -linearity of the electrical resistivity in optimal doping can be derived from considering the interplay between the composite fermion bands. It is also found that the anomaly of optical sum rules can be explained in a similar mechanism.

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- [3] K. Nishi, J. Phys. Conf. Ser. **1054** (2018) 012013.
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