Contribution ID: **812** Type: **Oral**

The study on temperature dependent superfluid density of anisotropic superconductors

Tuesday 22 May 2018 10:30 (15 minutes)

The most of superconductors are highly anisotropic superconductors, then the measurement on superfluid density propertied of superconductors are complicated that they are dependent on direction of measurement. In this study, the superfluid density of anisotropic superconductors was studied by semiclassical approach. We interested in the spin-singlet superconductors state with anisotropic spherical Fermi surface. The anisotropic gap function with ellipse spherical shape in weak-coupling limit was used. After some calculation, we can derive the temperature dependent formula of superfluid density near zero-temperature for ab- and c- spatial components. The numerical calculation fit to the experimental data of CaAlSi superconductors was shown and we found that our model can fit well. Then CaAlSi superconductor shows the anisotropic in the superfluid density.

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Session Classification: A6: Condensed Matter and Accelerators

Track Classification: Condensed Matter Physics