Contribution ID: **157** Contribution code: **S06-CMPSP-207** Type: **Poster presentation**

Terahertz Radiation from the BSCCO Single Crystal in resonance region

Tuesday, August 30, 2022 6:00 PM (1h 30m)

Since the intrinsic Josephson effects in high-temperature superconductors were first investigated by R. Kleiner and P. Muller, various kinds of new phenomena related to the ¨effects have been found [1-5]. In this work, the emission of terahertz electromagnetic waves from an intrinsic Josephson junction array (IJJA) embedded in an LCR resonant circuit is studied theoretically. A bias current is applied to the electrodes at the top and bottom of the array. In the voltage state, the ac Josephson current generates a displacement current in the IJJA, and both the currents induce an oscillating current in the electrodes. The whole system, including the array and the environment around it, has been described in terms of an LCR resonant circuit. When the Josephson frequency is in the resonance frequency region of the LCR circuit, the amplitudes of the displacement current in the Josephson junction array and the oscillating current in the electrodes both are strongly enhanced by a feedback process. The emission power and the current-voltage (I-V) characteristic curve for the system has been calculated. Inside the frequency region of the LCR circuit resonance, stable and intense emission occurs in both the increasing and decreasing processes of the high-bias current. In the emission region the I-V characteristic curve has a dip structure. These results are consistent with those of the emission observed in a high-bias current region by using mesa-shaped samples of BSCCO.

References:

1. R. Kleiner et al., ¨ Phys. Rev.Lett. 68, 2394 (1992).
2. K. Lee et al., Phys. Rev. B 61, 3616 (2000).
3. M. Tachiki et al., Phys. Rev. B 71, 134515 (2005).
4. S.Lin, *Annual Report on Numerical Study of Strong and Coherent Radiation of Terahertz Electromagnetic Waves from High-Tc Superconductors*, 2014
5. T.Benseman et al., APS March Meeting Abstracts 2021, S47. 001 (2021).

Primary author: IVANOVIĆ, Krsto (Faculty of Natural Sciences and Mathematics, University of Montenegro)

Presenter: IVANOVIĆ, Krsto (Faculty of Natural Sciences and Mathematics, University of Montenegro)

Session Classification: Poster session

Track Classification: Scientific Sections: S06 Condensed Matter Physics and Statistical Physics