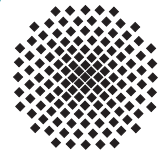


# Stuttgarter Physikalisches Kolloquium

Max-Planck-Institut für Festkörperforschung  
Max-Planck-Institut für Intelligente Systeme  
Fachbereich Physik, Universität Stuttgart

Ansprechpartner: Christian Ast  
E-Mail: C.Ast@fkf.mpg.de  
Telefon: 0711 - 689-5250



Dienstag, 11. Juli 2017

17.15 Uhr

Hörsaal 2D5

Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

## Inside the THz gap – intrinsic Josephson junctions in high temperature superconductors

Reinhold Kleiner  
Universität Tübingen

### Abstract

Having small sized active and tunable devices operating at frequencies up to the Terahertz (THz) range is one of the goals of modern electronics. However, there is still a lack of good active or passive devices, often referred to as the "Terahertz gap". Such devices would open a window to applications like nondestructive imaging for materials testing or medical diagnosis, or to novel spectroscopic studies of materials and molecules [1,2]. Intrinsic Josephson junctions formed by the layered crystal structure of high temperature superconductors such as  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_8$  have the potential to operate in this regime [3]. While for a long time the research on THz generation with this type of junctions was carried out with perhaps only modest success, recently a significant output power was reported [4,5]. In this talk, after an introduction into the physics of Josephson junction oscillators and the physics of intrinsic Josephson junctions, I will discuss recent experiments on THz generation and the status of theoretical interpretations.

[1] B. Ferguson u. X. C. Zhang, Nature Materials **1**, 26 (2002)

[2] M. Tonouchi, Nature Photonics **1**, 97 (2007).

[3] R. Kleiner, F. Steinmeyer, G. Kunkel u. P. Müller, Phys. Rev. Lett. **68**, 2394 (1992).

[5] L. Ozyuzer, A. E. Koshelev, C. Kurter, N. Gopalsami, Q. Li, M. Tachiki, K. Kadowaki, T. Yamamoto, H. Minami, H. Yamaguchi, T. Tachiki, K. E. Gray, W.-K. Kwok u. U. Welp, Science **318**, 1291 (2007).

[5] U. Welp, K. Kadowaki, R. Kleiner, Nature Photonics **7**, 702 (2013).