

# Electron paramagnetic resonance in superconducting cuprates

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## Abstract

© 2017, Springer International Publishing AG. The way to a discovery of the high temperature superconductivity (HTSC) was started by Alex Müller with his study of partially covalent character of transition elements in oxides having perovskites structure by the electron paramagnetic resonance (EPR) method. It was actually the beginning of his scientific carrier: the first results were obtained in his thesis "Paramagnetische Resonanz von  $\text{Fe}^{3+}$  in  $\text{SrTiO}_3$  Einkristall" [1]. It is appropriate to remind that the discovered many years later superconducting cuprates have just the perovskites structure. Between the first step and this discovery were obtained a long chain of important results concerning the Jahn-Teller effect, structural phase transitions, photochromism, ferroelectricity, itinerant polarons and other properties of perovskites using the EPR and other methods. The relevant original works (concluded by the HTSC discovery) are collected in a volume "Properties of Perovskites and Other Oxides", containing 562 pages [2]. It seems that these milestones on the way to a discovery were not occasional ones. From one hand a deep insight into condensed matter physics from the very beginning became possible due to a very good background: in his student time Alex Müller had a course of lectures in theoretical physics given by Wolfgang Pauli during four semesters. On the other hand there were some stimuli, which supported the following investigations of the perovskites properties. One of them was quite unusual: a lofty dream which had Alex about that time. A description of this dream can be found in the KAM's article "Annäherungen ans Feuer" ("Approaching to a fire"), which was published in a volume dedicated to a psychiatrist C.G. Jung and a writer E. Jünger [3]. Below is given my attempt to translate it from German (page 39): "In a dream I saw Wolfgang Pauli sitting similar to Buddha in a deep meditation (1.5 years before his death), having in his right hand a high-symmetric crystal of  $\text{SrTiO}_3$  with a cubic symmetry of the lattice. A coming white beam of light was decomposed by it into the colored spectra. This dream, looking back now, was for me during four decades decisive, namely for my scientific research and its success, and for my health too."

[http://dx.doi.org/10.1007/978-3-319-52675-1\\_13](http://dx.doi.org/10.1007/978-3-319-52675-1_13)

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