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<th>Terahertz surprises in condensed matter: nutating spins, up-converting phonons and &quot;lollipop&quot; metamaterials</th>
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| Vortragender| Prof. Dr. Stefano Bonetti  
Stockholm University and University of Venice                                                        |
| Ort         | Hörsaalgebäude II  
Hörsaal 2                                                                                         |
| Zeit        | Dienstag, den 16. April 2019  
16:30 Uhr                                                                                         |

Kolloquiums-Kaffee ab 16:00 Uhr  
im Raum P2-E0-414  
(Alle sind herzlich eingeladen)
Terahertz surprises in condensed matter: nutating spins, up-converting phonons and “lollipop” metamaterials

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The use of terahertz radiation to investigate different physical systems has been rapidly increasing in recent years. In condensed matter physics, collective excitations of lattice and spin degrees of freedom are typically found in this frequency range. The concomitant development of commercial, intense Ti:sapphire laser systems, as well as of nonlinear crystal allowing for efficient optical rectification, has allowed researchers to have easy access to terahertz electric (magnetic) fields as high as 1 MV/cm (0.3 T). Such large fields are strong enough to initiate nonlinear effects in both phonon and spin dynamics.

In this talk, I will discuss three aspects of research in condensed matter physics involving terahertz radiation that are of relevant for the search of new strategies for information storage and processing. At first, I will present the design of metamaterials aimed at locally enhancing by an order of magnitude the magnetic field of impinging, free-space terahertz radiation into solid-state samples. Then, I will show recent unpublished results of terahertz spectroscopy of spin dynamics performed at the TELBE facility in Dresden, revealing the appearance of yet experimentally elusive spin nutations. Finally, I will conclude by discussing a recent published work where we used femtosecond X-ray diffraction to observe nonlinear phonon dynamics driven by intense single-cycle pulses in the quantum material strontium titanate, and we found a strongly anharmonic behaviour able to induce excitation of higher frequency forbidden phonon modes.