



universität  
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Fakultät für Mathematik

## Mathematisches Kolloquium

**Mittwoch, 22. Mai 2024**

Sky Lounge

### EINLADUNG

**Wolfgang Reichel**

(Karlsruher Institut für Technologie)

**„Time-Periodic Waves for Maxwell Equations with  
Nonlinear Polarization“**

### **„Time-Periodic Waves for *Maxwell* Equations with Nonlinear Polarization “**

#### ***Abstract:***

The Maxwell equations govern the propagation of electromagnetic waves in matter. In many cases the material properties do not change when an electromagnetic wave propagates through them. However, for a class of materials, the refractive changes in a nonlinear way in the presence of a sufficiently strong electric field  $E$ .

In this talk I will consider a model for a class of materials with nonlinear polarization properties. I will further consider special geometries where one can prove the existence of propagating time-periodic electromagnetic waves which are localized in directions orthogonal to the propagation direction. This problem leads to a quasilinear hyperbolic nonlinear partial differential equation for the electric field  $E$ . Solutions with the above properties (localized, time-periodic, propagating) will be found by a variational principle. Numerical simulations will also be shown. This is joint work with Sebastian Ohrem (KIT).

**14.45 Uhr: Kaffeejause**

**15.15 Uhr: Vortrag**

**vinum cum pane im Anschluss**

Adrian Constantin  
Jörg Weber  
Radu Ioan Bot