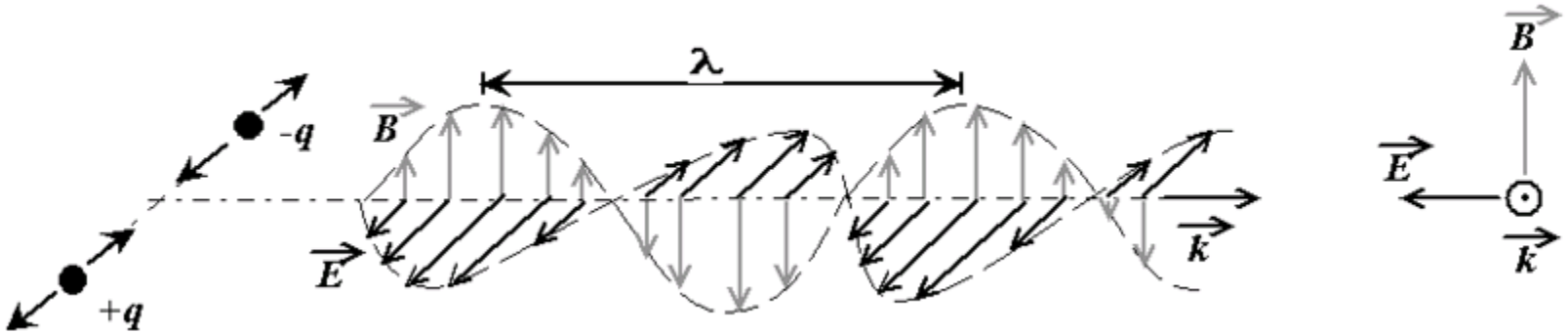
# Ch. 7  EM Wellen im Vakuum

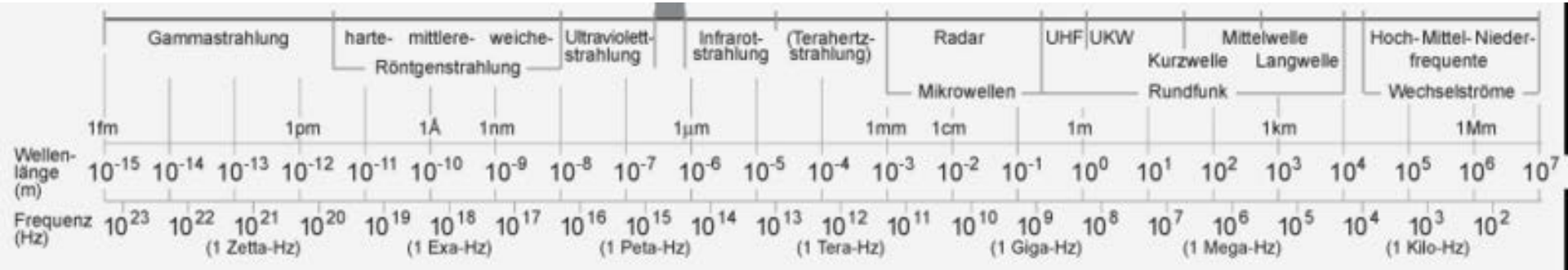
- Lösung der Maxwell Gleichungen
- EM Wellen Spektrum
- Polarisation
- Energie Transport
- Stehende Wellen

# EM Wellen

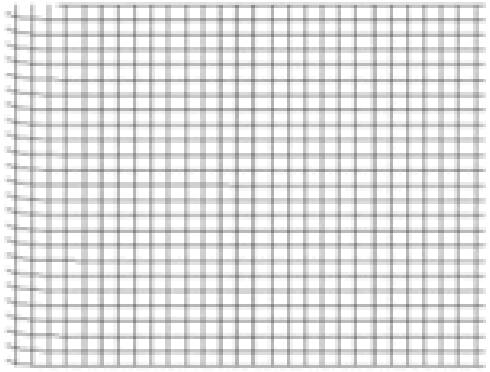
$$\left.\begin{aligned}
&\nabla \cdot \mathbf{E} = 0 \\
&\nabla \times \mathbf{E} = -\frac{\partial}{\partial t}\mathbf{B} \\
&\nabla \cdot \mathbf{B} = 0 \\
&\nabla \times \mathbf{B} = \mu_0 \epsilon_0 \frac{\partial}{\partial t}\mathbf{E}
\end{aligned}\right\}
\quad
\begin{aligned}
&\nabla^2 \mathbf{E} = \mu_0 \epsilon_0 \frac{\partial^2}{\partial t^2}\mathbf{E} \\
&\nabla^2 \mathbf{B} = \mu_0 \epsilon_0 \frac{\partial^2}{\partial t^2}\mathbf{B}
\end{aligned}
\qquad c = \frac{1}{\sqrt{\mu_0 \epsilon_0}}$$

$$\nabla \times (\nabla \times \mathbf{A}) = \nabla (\nabla \cdot \mathbf{A}) - \nabla^2 \mathbf{A}$$

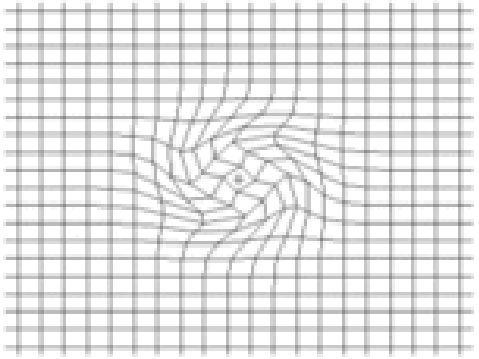


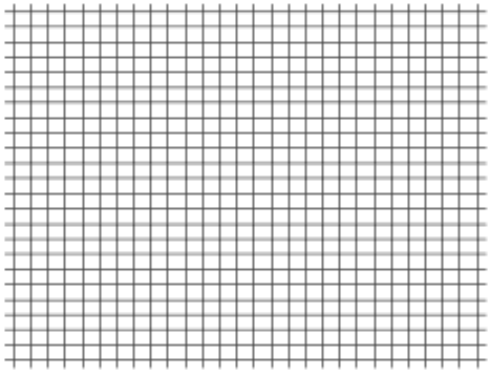
## Ebene Transversalwelle



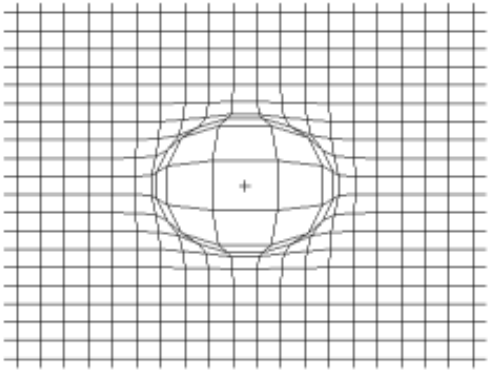
## Transversalwelle (zyl. oder Kugel Symetrie)



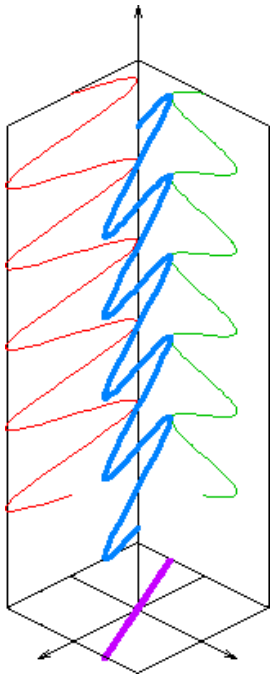
## Ebene Longitudinalwelle

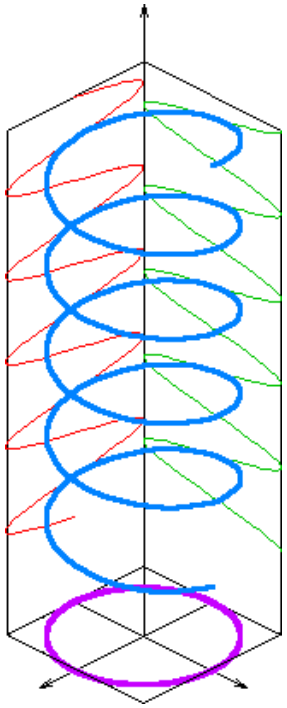


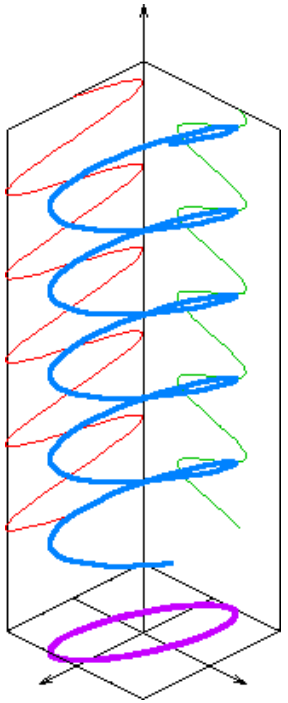
## Longitudinalwelle (zyl. oder Kugel Symetrie)



# Polarisation

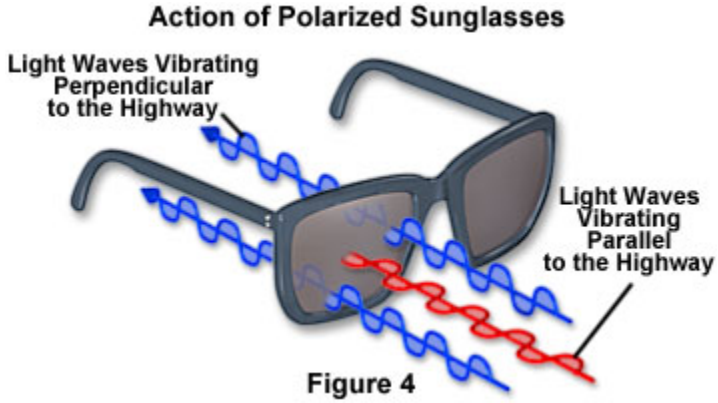






**linear** **circular** **elliptical**

# Polarisation



# 1D stehende Welle

*durch Reflexion and leitende Ebene*