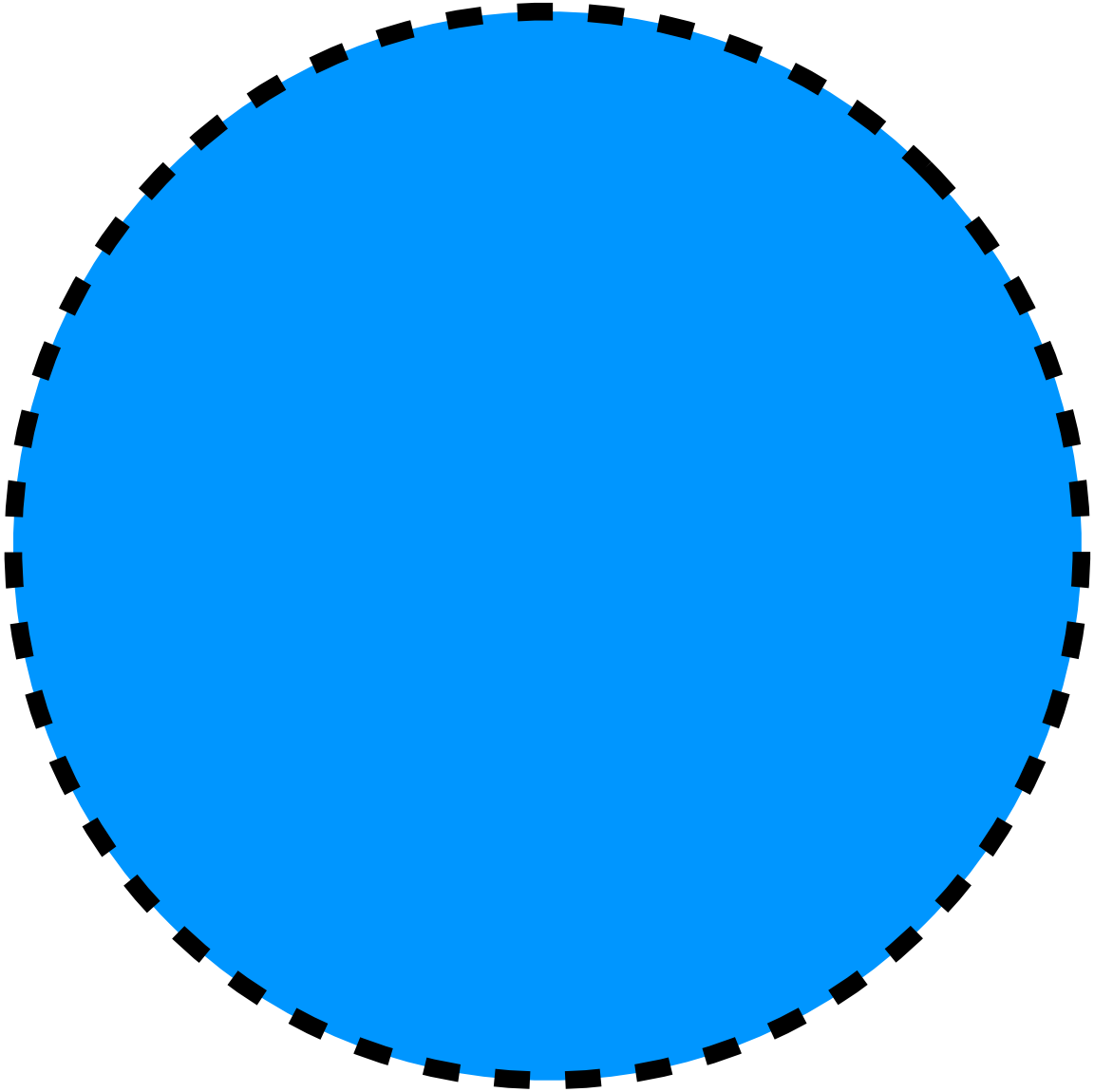

Light-sound interaction: Brillouin scattering

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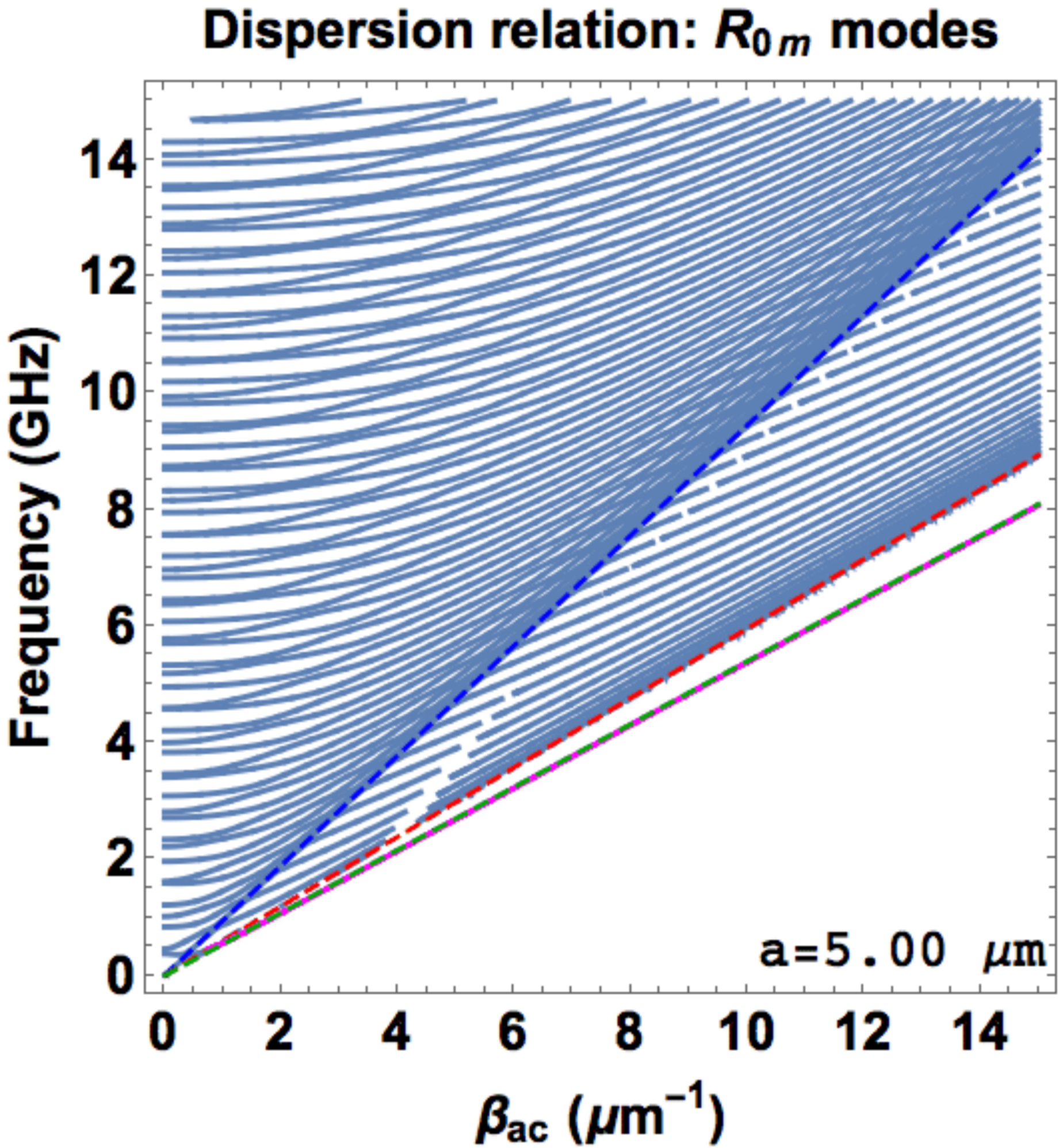
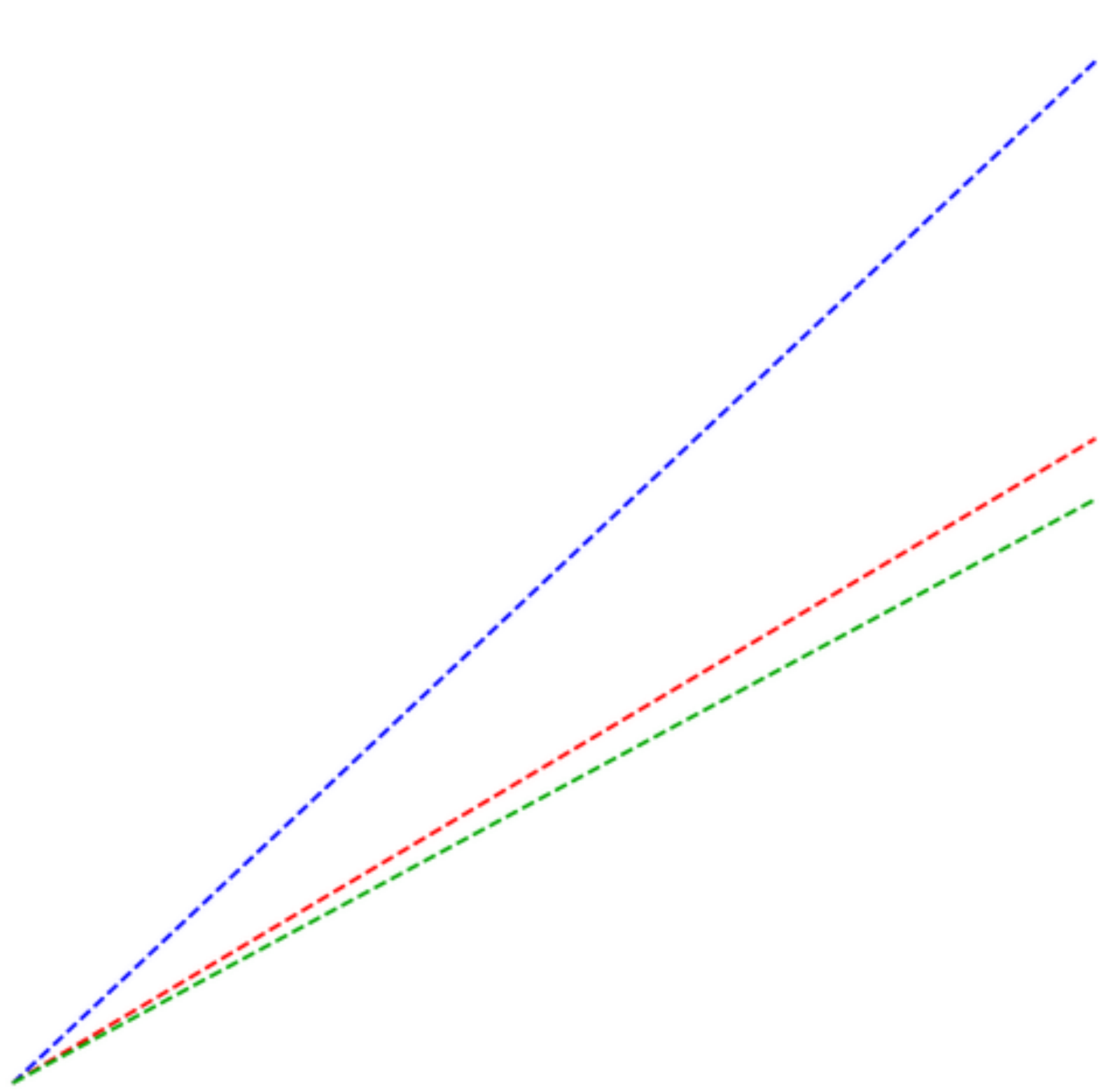
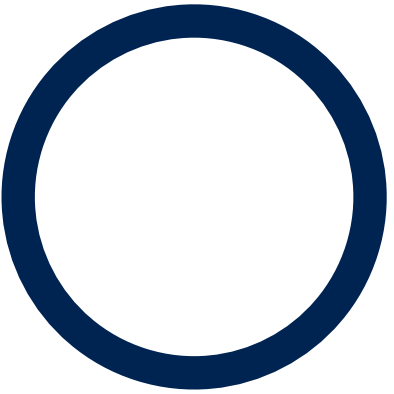
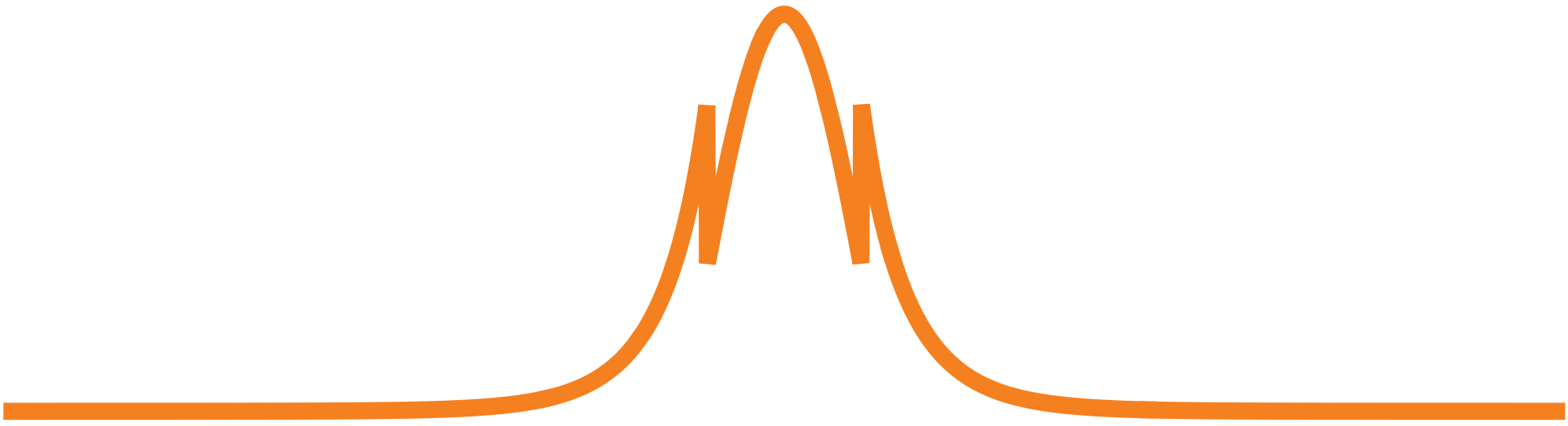
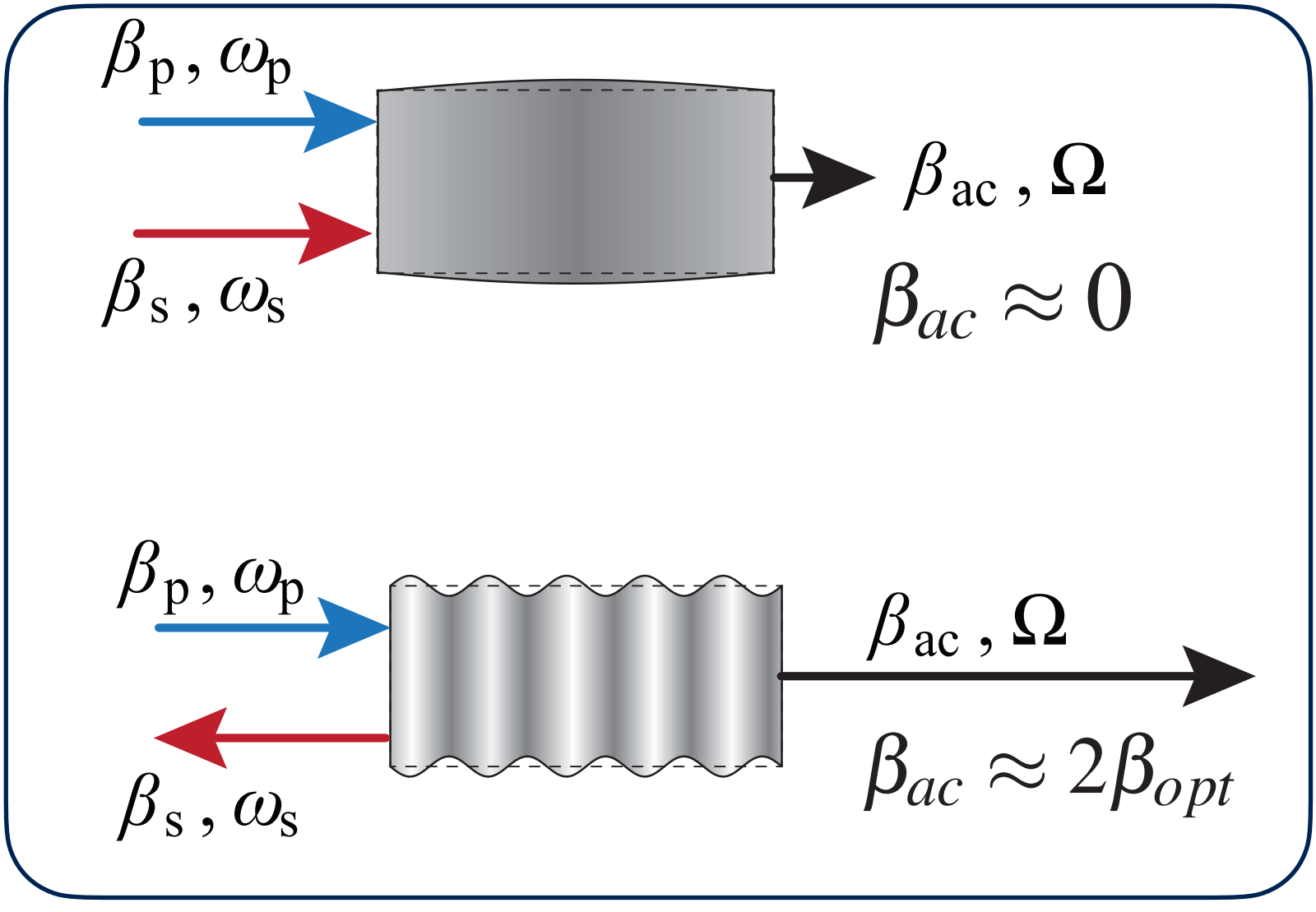
Wombat 2022, Erlangen, June 14th 2022. Gustavo Wiederhecker.


Dispersion relation: $R_{0\,m}$ modes
Frequency (GHz)
0
2
4
6
8
10
12
14
a=5.00 μm
0
2
4
6
8
10
12
14
β_{ac} (μm^{-1})

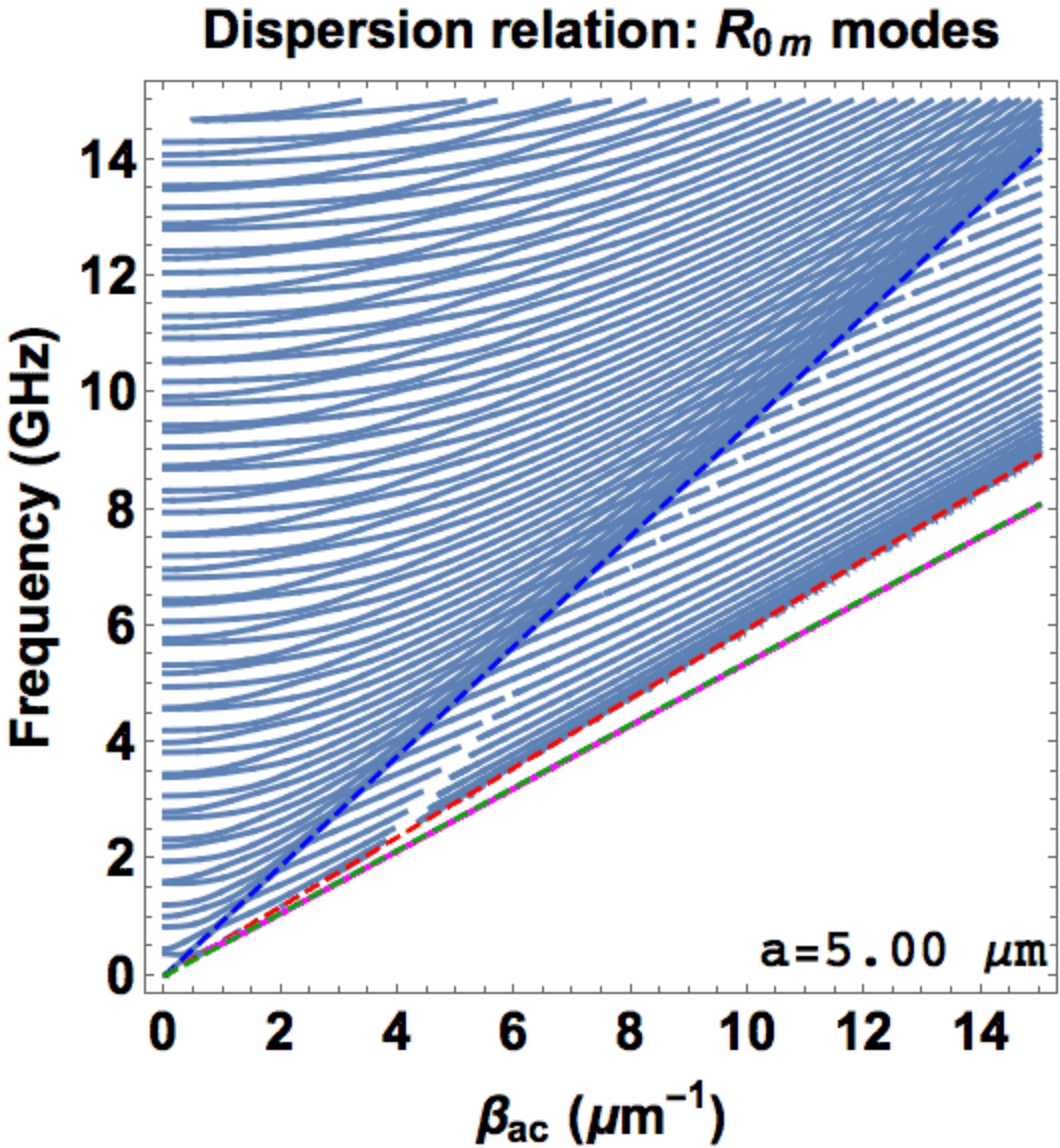


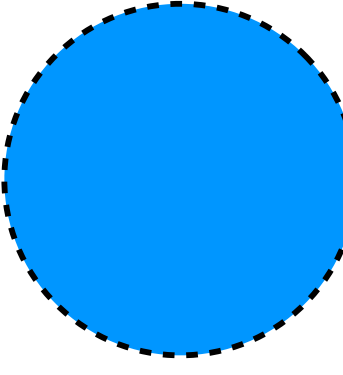




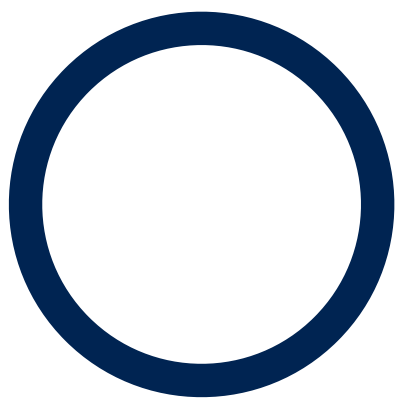


Phase matching for Stokes scattering


Dispersion relation: $R_{0\,m}$ modes
Frequency (GHz)
0
2
4
6
8
10
12
14
β_{ac} (μm^{-1})
a=5.00 μm



Mechanical modes



Elastic wave equation

$$\left[(\lambda+2\mu)+\eta_{11}\frac{\partial}{\partial t}\right]\nabla(\nabla\cdot\boldsymbol{U})-\left[\mu+\eta_{44}\frac{\partial}{\partial t}\right]\nabla\times\nabla\times\boldsymbol{U}=\rho\frac{\partial^2\boldsymbol{U}}{\partial t^2}$$

longitudinal waves (

$$\nabla \times \mathbf{u} = 0$$

shear-only (

$$\nabla \cdot \mathbf{u} = 0$$

(b)

Mechanical frequency (GHz)

0
2
4
6
8
10
12
14

0
2
4
6
8
10
12
14

Wavevector, β_m (μm^{-1})

AR_{0m}
TR_{2m}
V_l
V_s
V_R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