

Photo-elastic (pe) vs. moving boundary (mb)



A grayscale micrograph showing a curved, light-colored surface against a dark background. The surface appears to be a thin layer or coating on a substrate. A white scale bar is located in the bottom left corner, with the text "3 μm" positioned above it.

3 μm

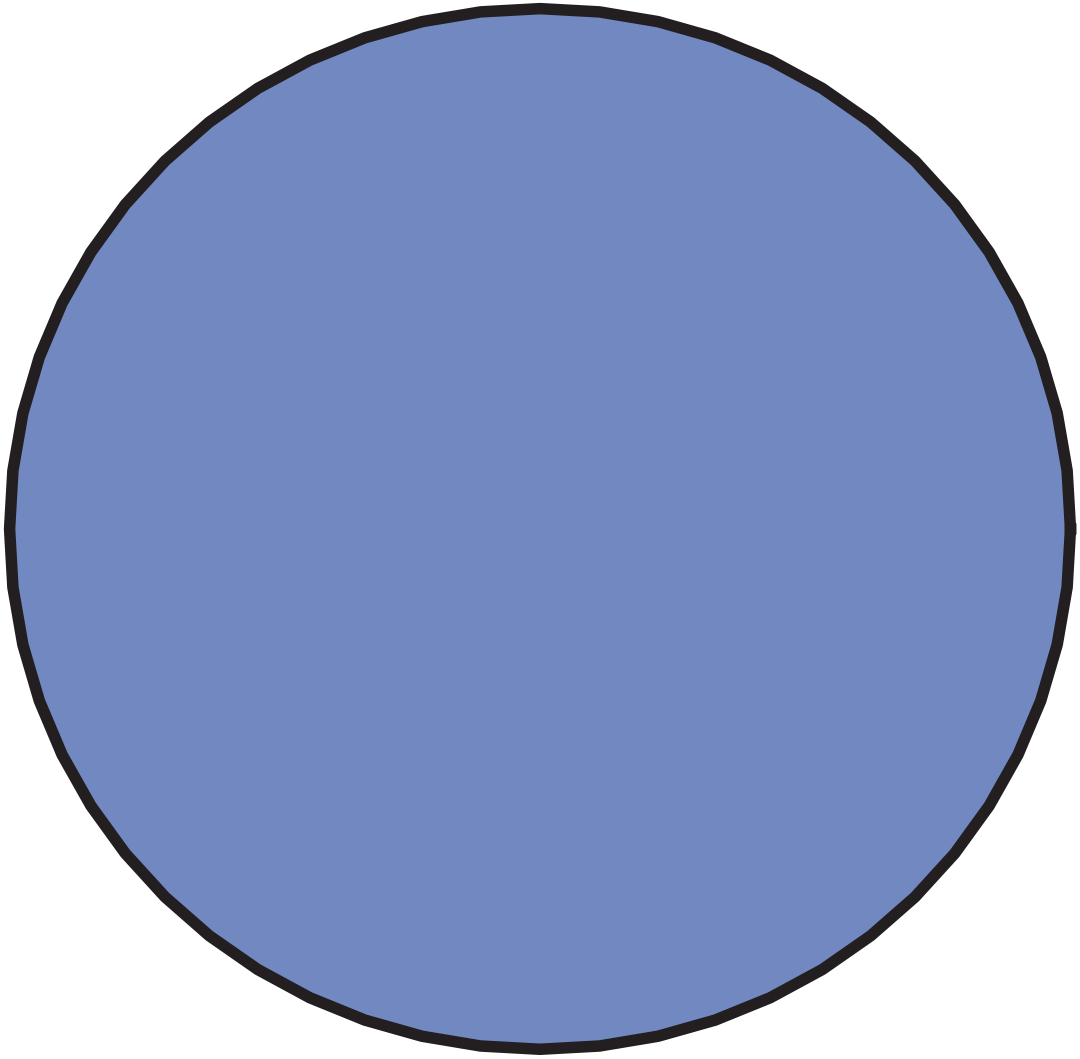
Example: Brillouin Self-cancellation

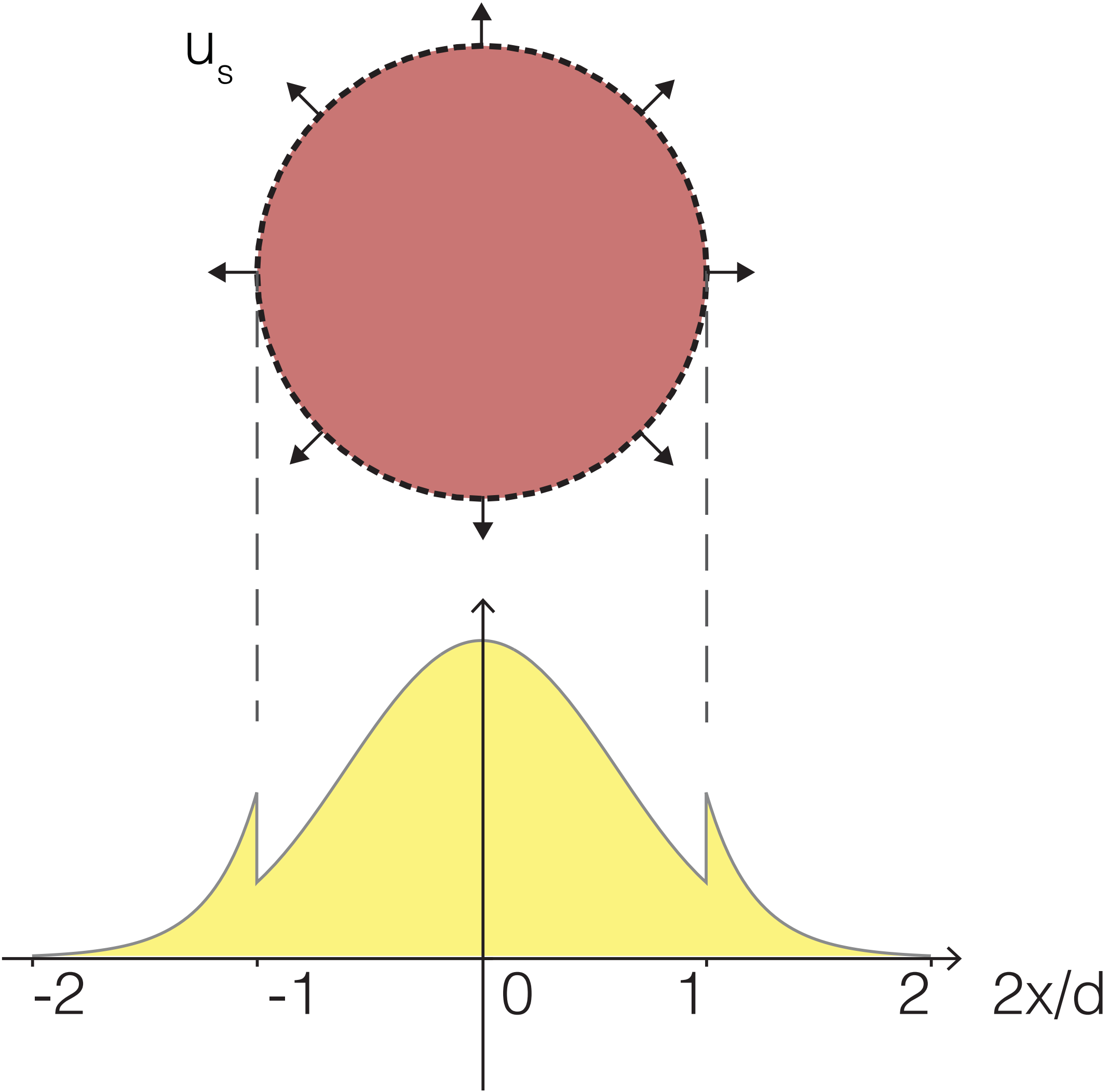
6

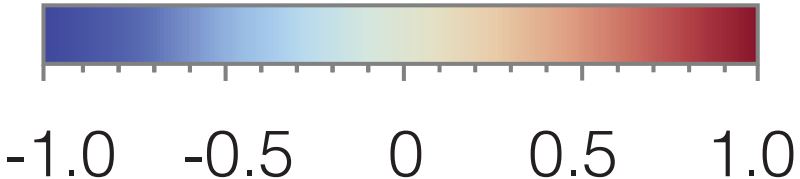
8

Wombat 2022, Erlangen, June 14th 2022. Gustav Wiederhake.



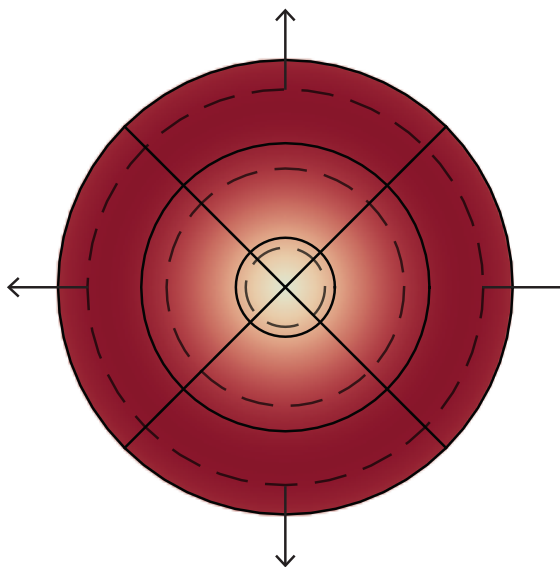




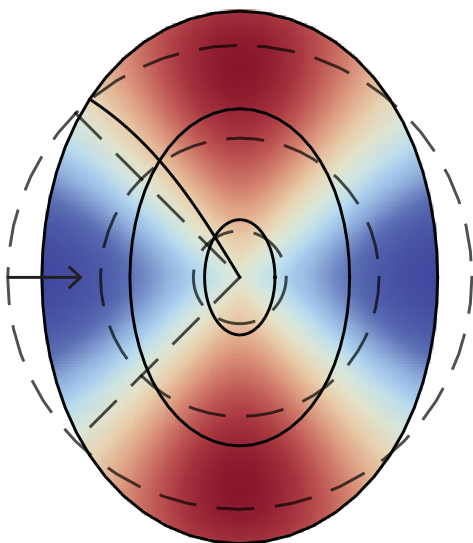


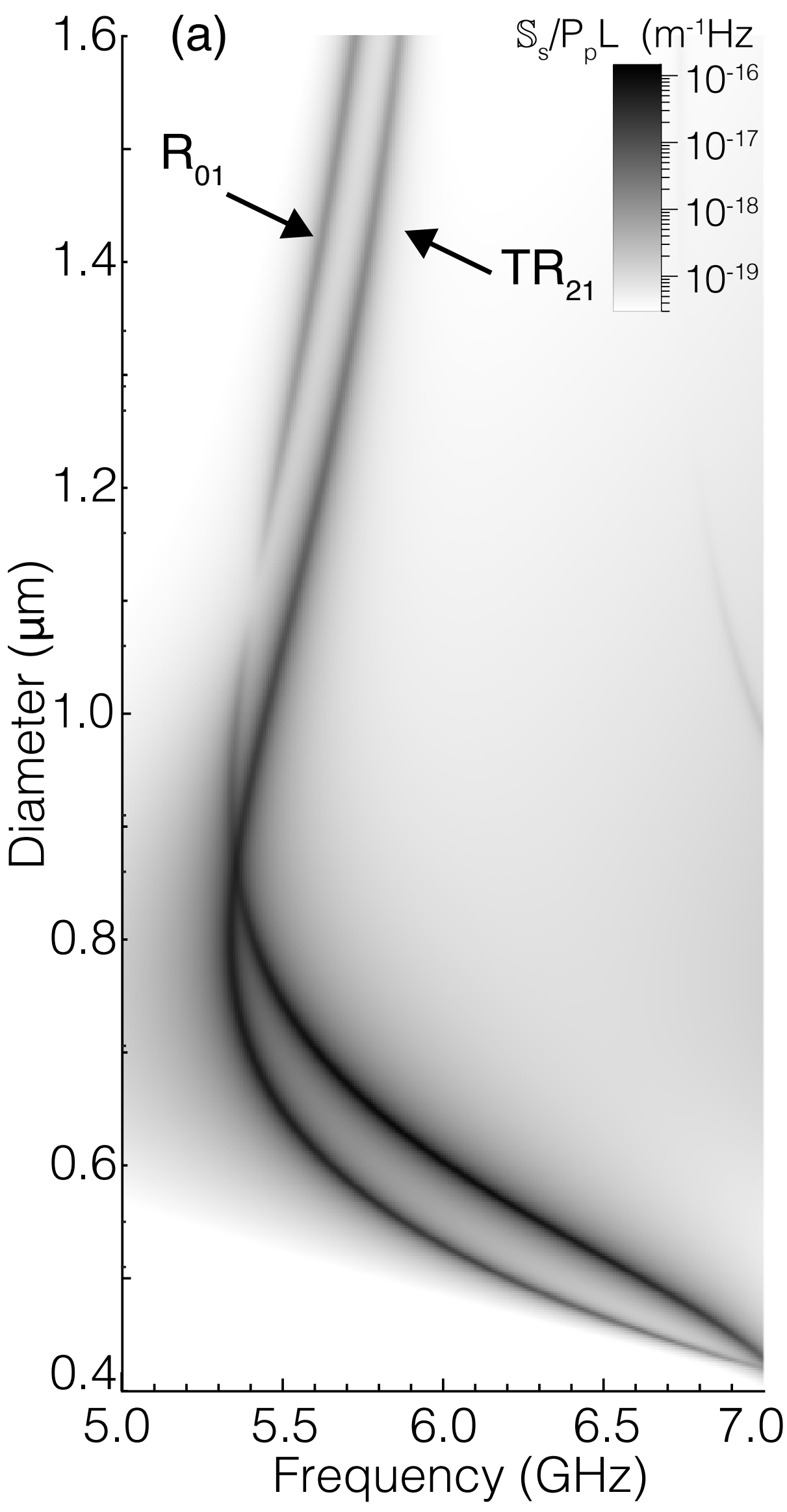
Displacement

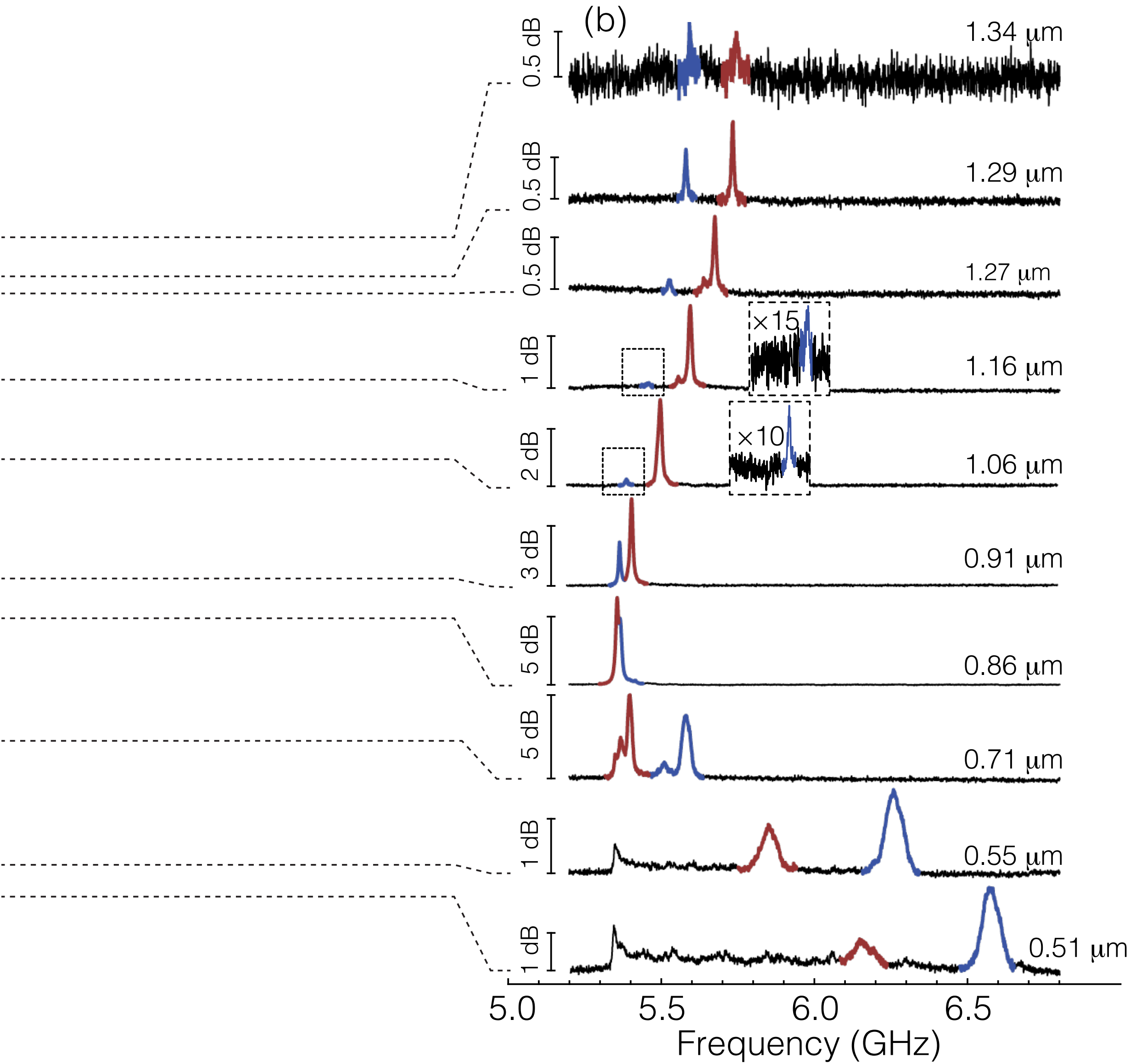
Radial (R_{01})



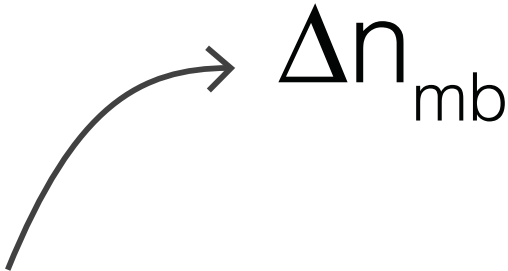
Torsional-Radial (TR_{21})

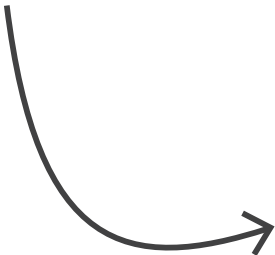






O'Flaherty et al. "Brillouin scattering self-correlation," Nat Comm, vol. 7, p. 11759, (2016).





Δn_{pe}

$$u_r = (2r/d)u_s$$

$$S_{rr} = \partial_r u_r = 2u_s/d$$

$$\Delta \epsilon_{\text{pe}} \equiv 2n\Delta n_{\text{pe}} \equiv -n^4 p_{11} S_r$$

$$\Rightarrow \Delta n_{\text{pe}} = -n^3 p_{11} \frac{u_s}{d}$$



$$\Delta n_{\text{mb}} = n_{\text{glass}} - n_{\text{air}}$$



$$A_{nb} = \pi u_s d$$

$$A_{pe} = \pi d^2/4$$



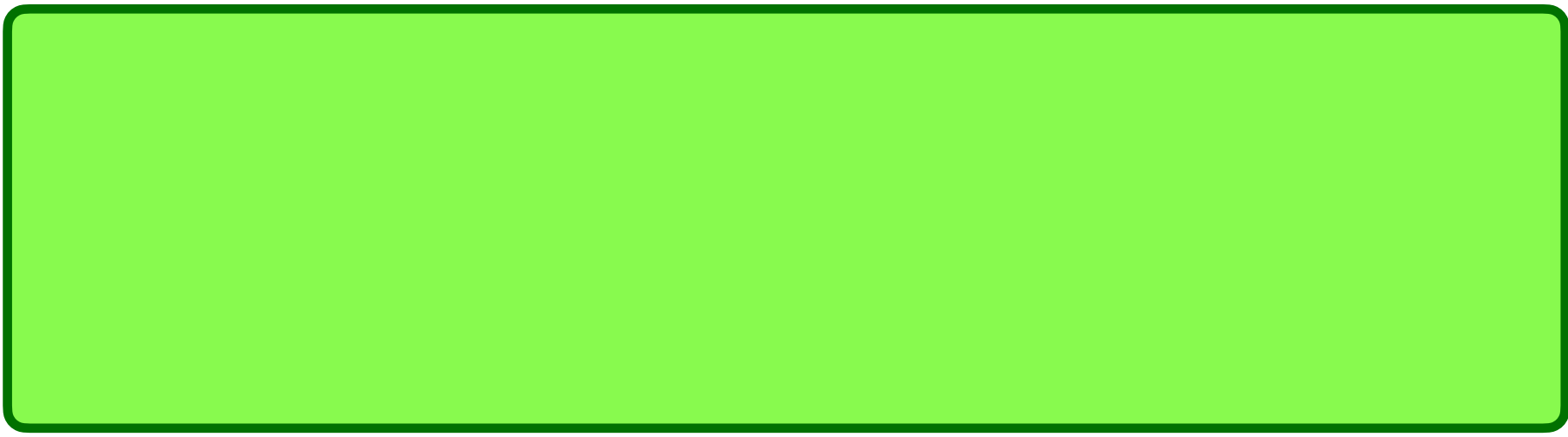


$\Delta n_{\text{pe}} A_{\text{pe}}$

 $\Delta n_{\text{mb}} A_{\text{mb}}$



$$\frac{\Delta n_{\text{pe}} A_{\text{pe}}}{\Delta n_{\text{mb}} A_{\text{mb}}} = \frac{-n^3 p_{11}}{4 \Delta n_{\text{mb}}} \approx -0.2$$



6

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O. Frez et al. 'Brillouin scattering self-correlation,' Nat Comm, vol. 7, p. 11759, (2016).