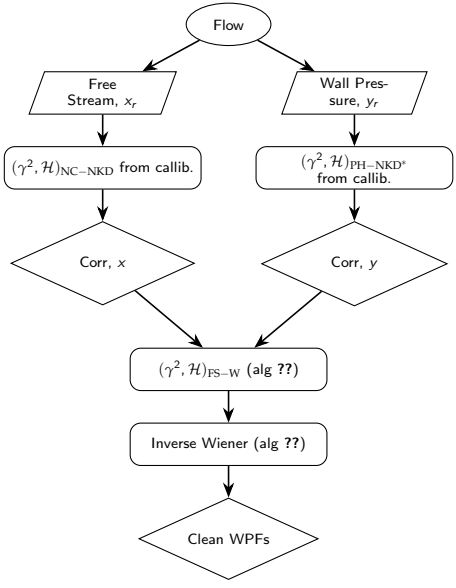

Figure: Complete pressure processing pipeline for measurement of the WPFs through a pinhole microphone.

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TF eq.

$$X(f;p_{\text{static}}) = \mathcal{F}\{p_{PH}(t;p_{\text{static}})\} \qquad Y(f;p_{\text{static}}) = \mathcal{F}\{p_{NC}(t;p_{\text{static}})\}$$
$$H(f;p_{\text{static}}) = XY^*/(YY^*)$$

$$Z(f;p_{\text{static}}) = \mathcal{F}\{p_{NKD}(t;p_{\text{static}})\} \qquad Y(f;p_{\text{static}}) = \mathcal{F}\{p_{NC}(t;p_{\text{static}})\}$$
$$H(f;p_{\text{static}}) = YZ^*/(ZZ^*)$$

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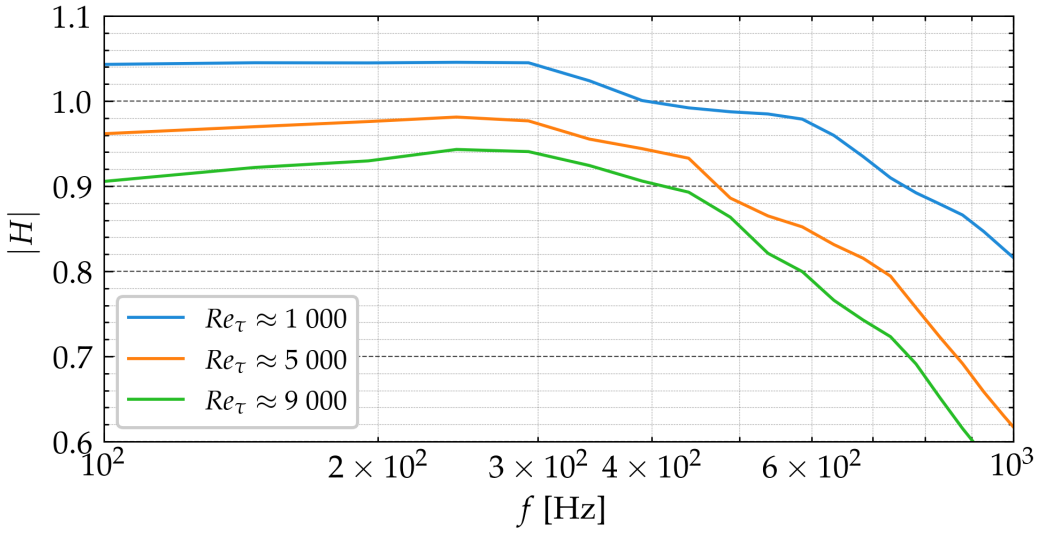

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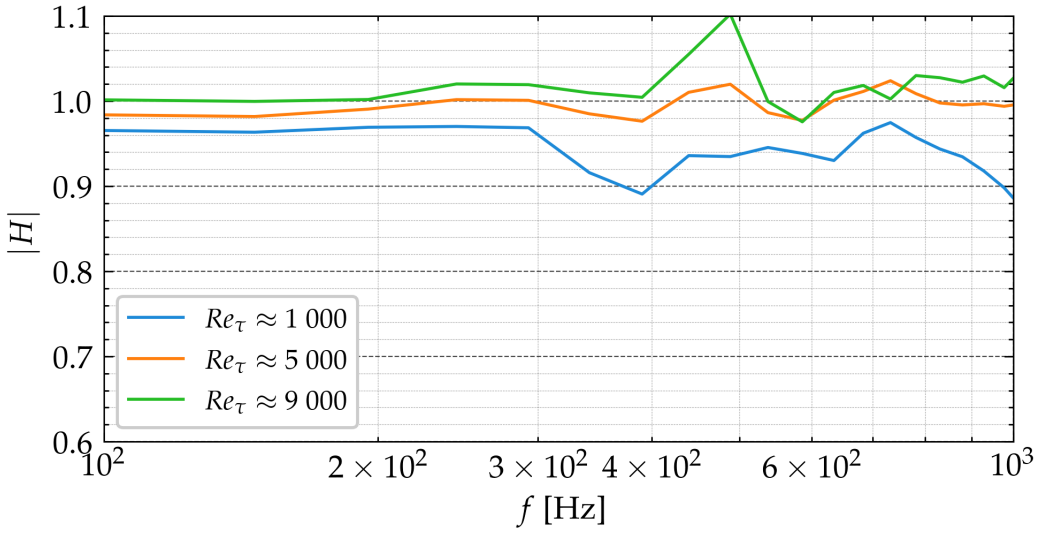

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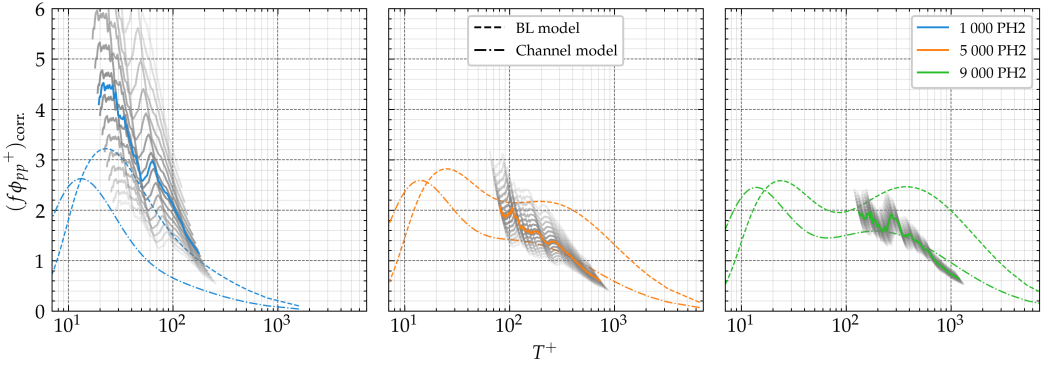
Spectra u_τ error



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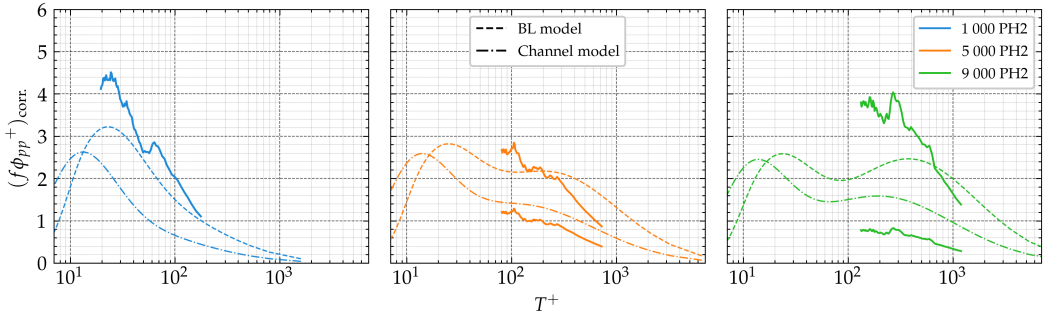
Pressure sensitivity correction $\alpha \in [0.005, 0.015] dBkPa^{-1}$ variation



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Cross-spectrum (CSD)

$$\Phi_{12}(f) = \langle X_1(f)\, X_2^*(f) \rangle \,,$$

$$f\,\phi_{12}^{+} = f\,\frac{|\Phi_{12}(f)|}{(\rho\, u_\tau^2)^2}\,.$$

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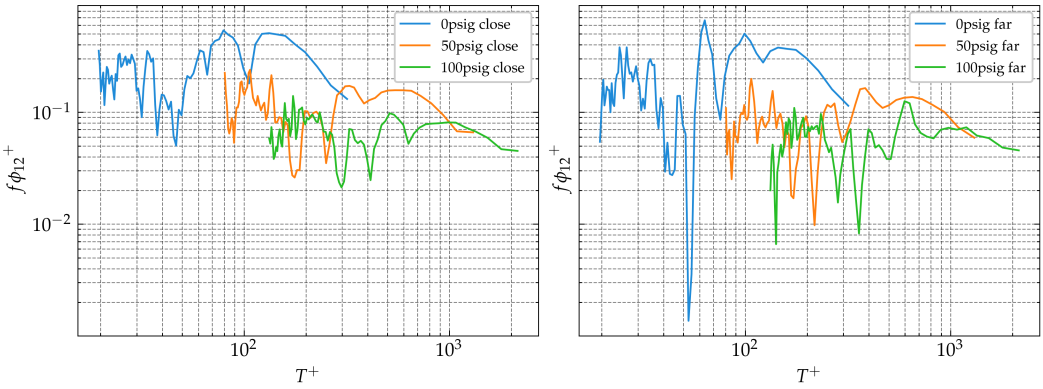
CSD



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Quad-spectrum (fourth-order cumulant)

$$C_4^{(c)}(f) = \left\langle X_1(f)\, X_1(f)\, X_2^*(f)\, X_2^*(f) \right\rangle - \Phi_{11}(f)\, \Phi_{22}(f) - \Phi_{12}(f)\, \Phi_{12}(f),$$

$$f\, \phi_{12}^{(4)+} = f\, \frac{|C_4^{(c)}(f)|}{(\rho\, u_\tau^2)^4}.$$

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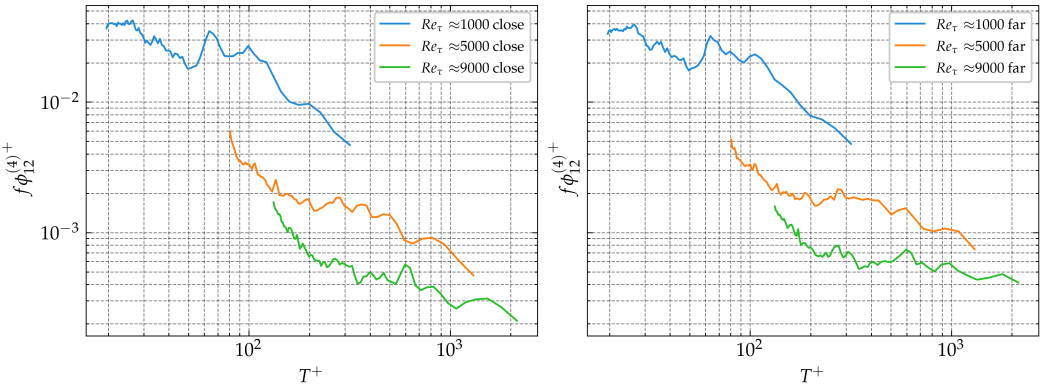
Quad-spectrum



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$$B_{xyz}(f_1, f_2) = \big\langle X(f_1)\, Y(f_2)\, Z^*(f_1{+}f_2) \big\rangle,$$

$$f_1 f_2\, |B|^+ = f_1 f_2\, \frac{|B_{xyz}(f_1, f_2)|}{(\rho\, u_\tau^2)^3},$$

$$b^2(f_1, f_2) = \frac{\big|\langle X(f_1)\, Y(f_2)\, Z^*(f_1{+}f_2)\rangle\big|^2}{\langle |X(f_1)Y(f_2)|^2\rangle\, \langle |Z(f_1{+}f_2)|^2\rangle}.$$

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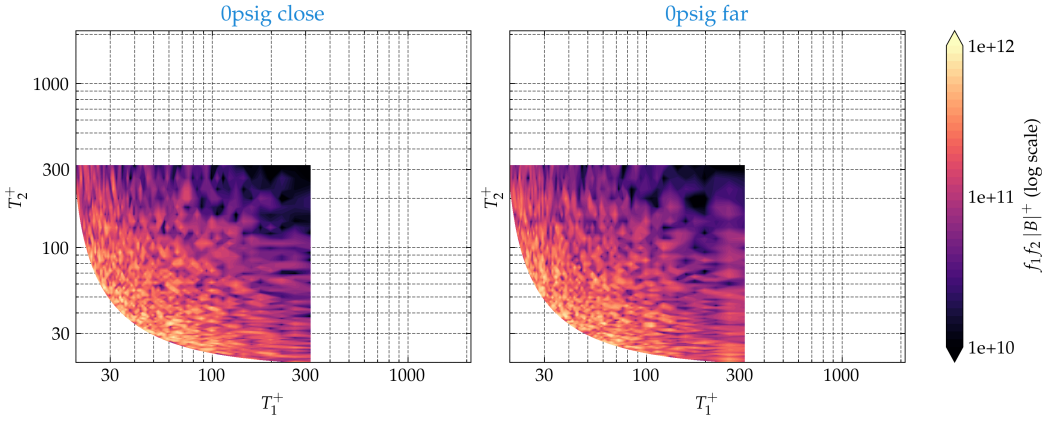
Bispectrum magnitude



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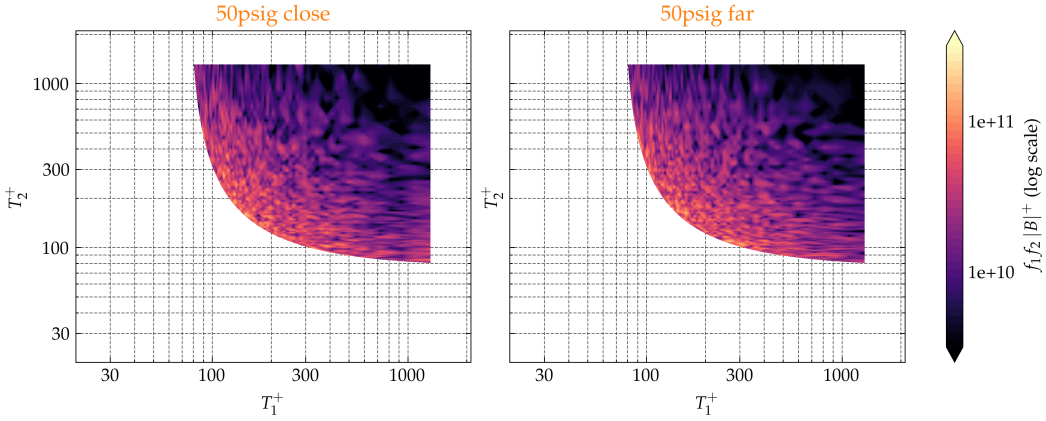
Bispectrum magnitude



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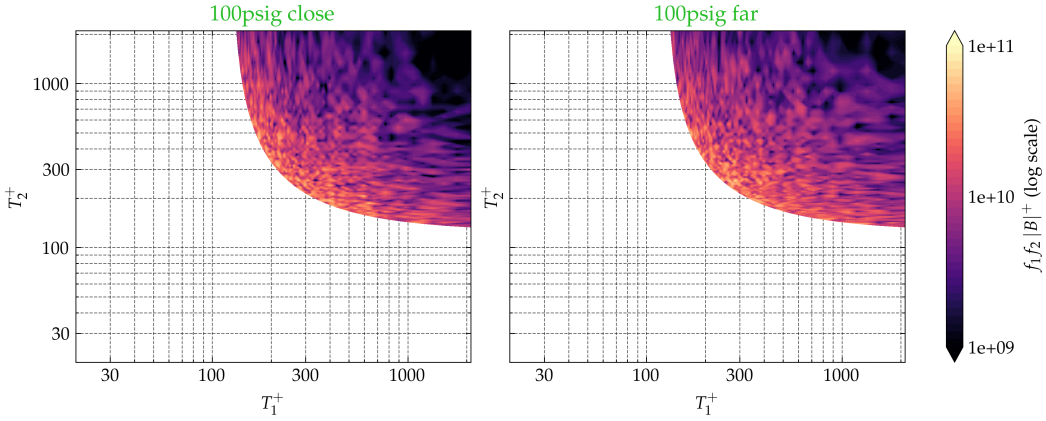
Bispectrum magnitude



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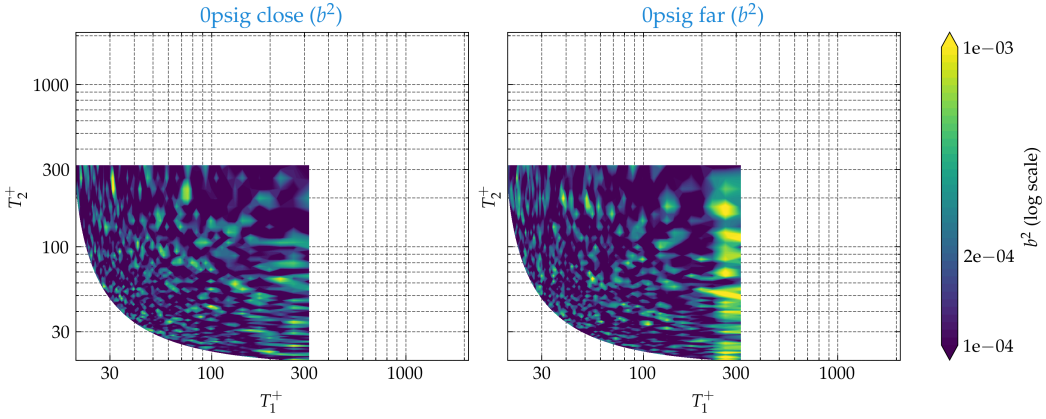
Bicoherence



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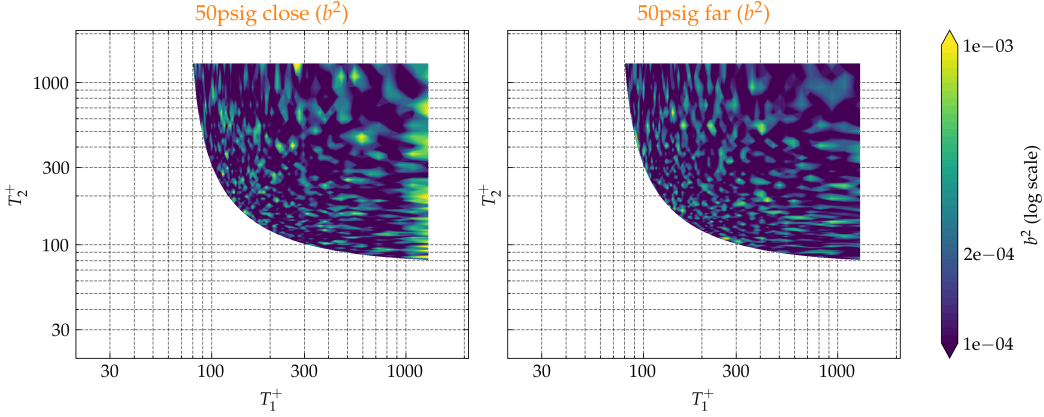
Bicoherence



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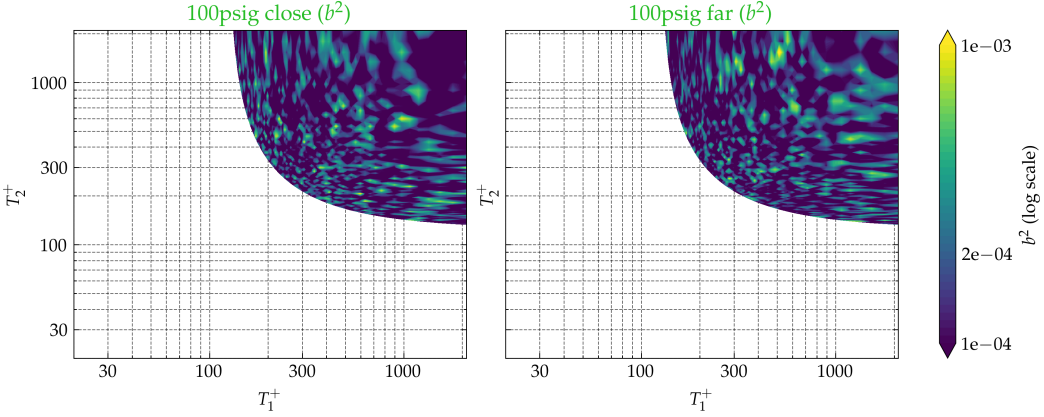
Bicoherence



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