Bubble Wall Velocity in Cosmological FOPT

Modeling the evolutions of bubbles

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Why Cosmological First Order Phase Transitions (FOPT)?

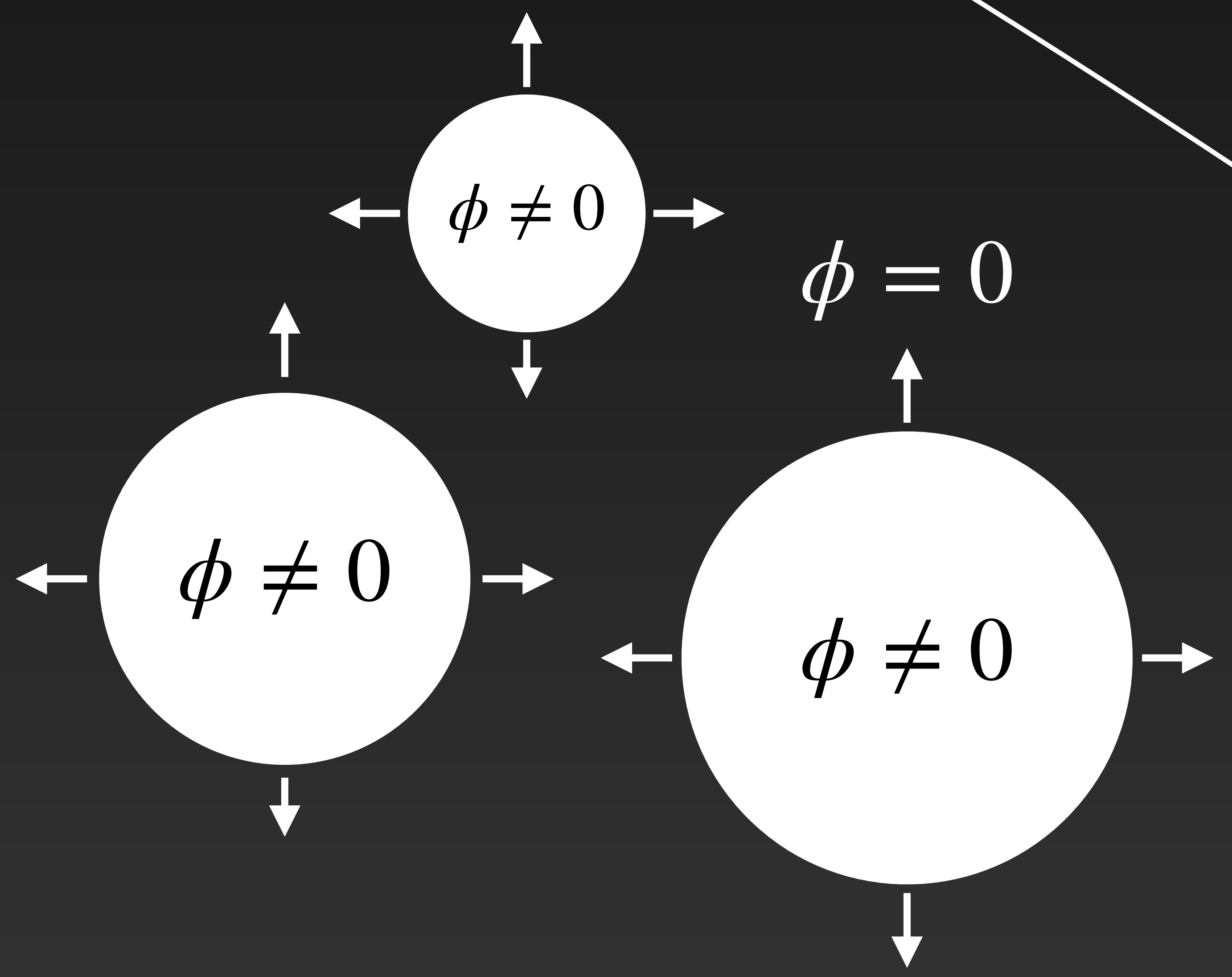
Bubble nucleation

→ Baryogenesis

→ Primordial magnetic fields

→ Stochastic background of gravitational waves

→ Particle Dark Matter



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The Klein-Gordon equation for the background field

$$\Box \phi + \frac{dV_0}{d\phi} + \sum_i \frac{dm_i^2}{d\phi} \int \frac{d^3p}{(2\pi)^3} \frac{1}{2E_i} f_i(p^\mu, x^\mu) = 0$$

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Solving the Boltzmann Equations for particles in the plasma

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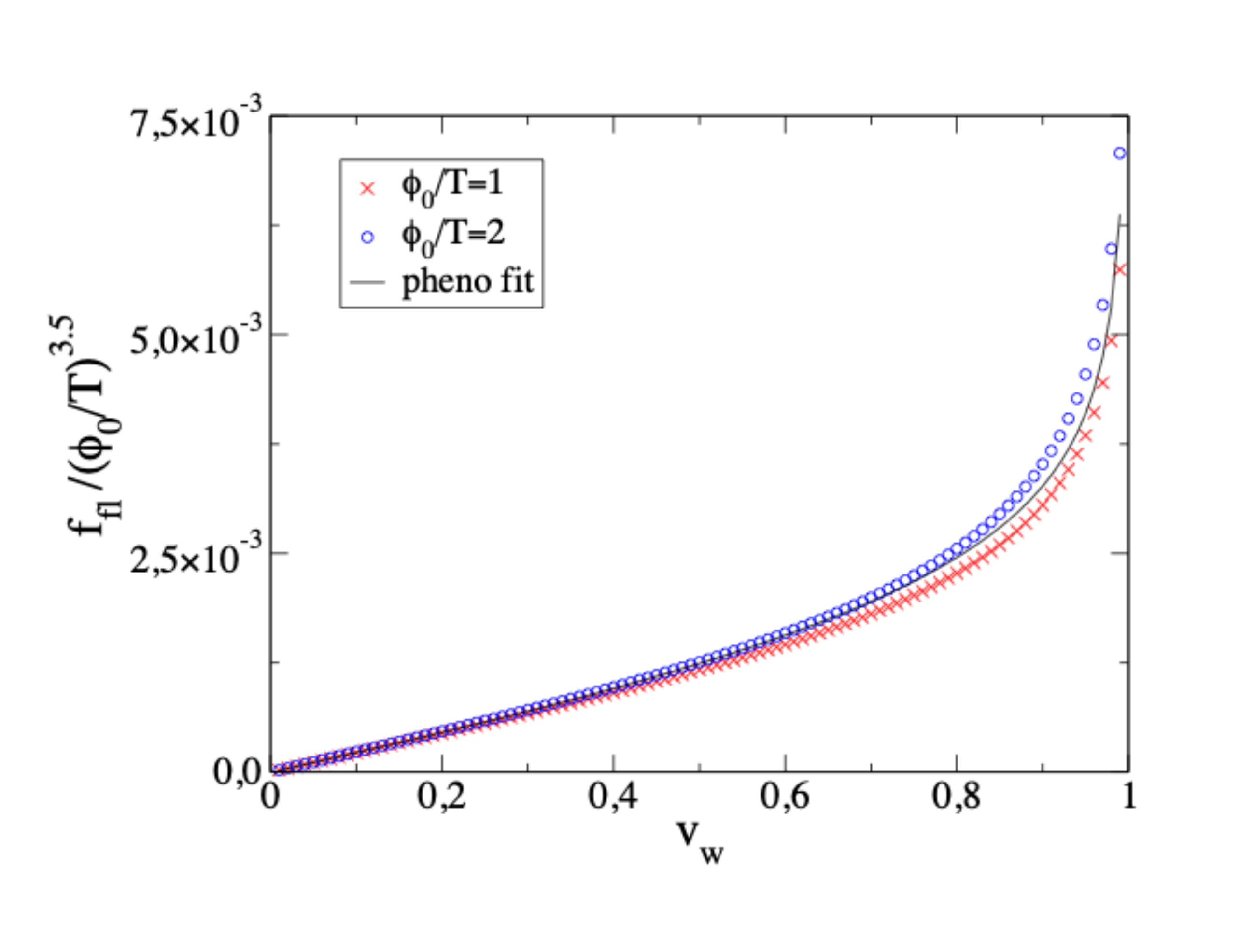

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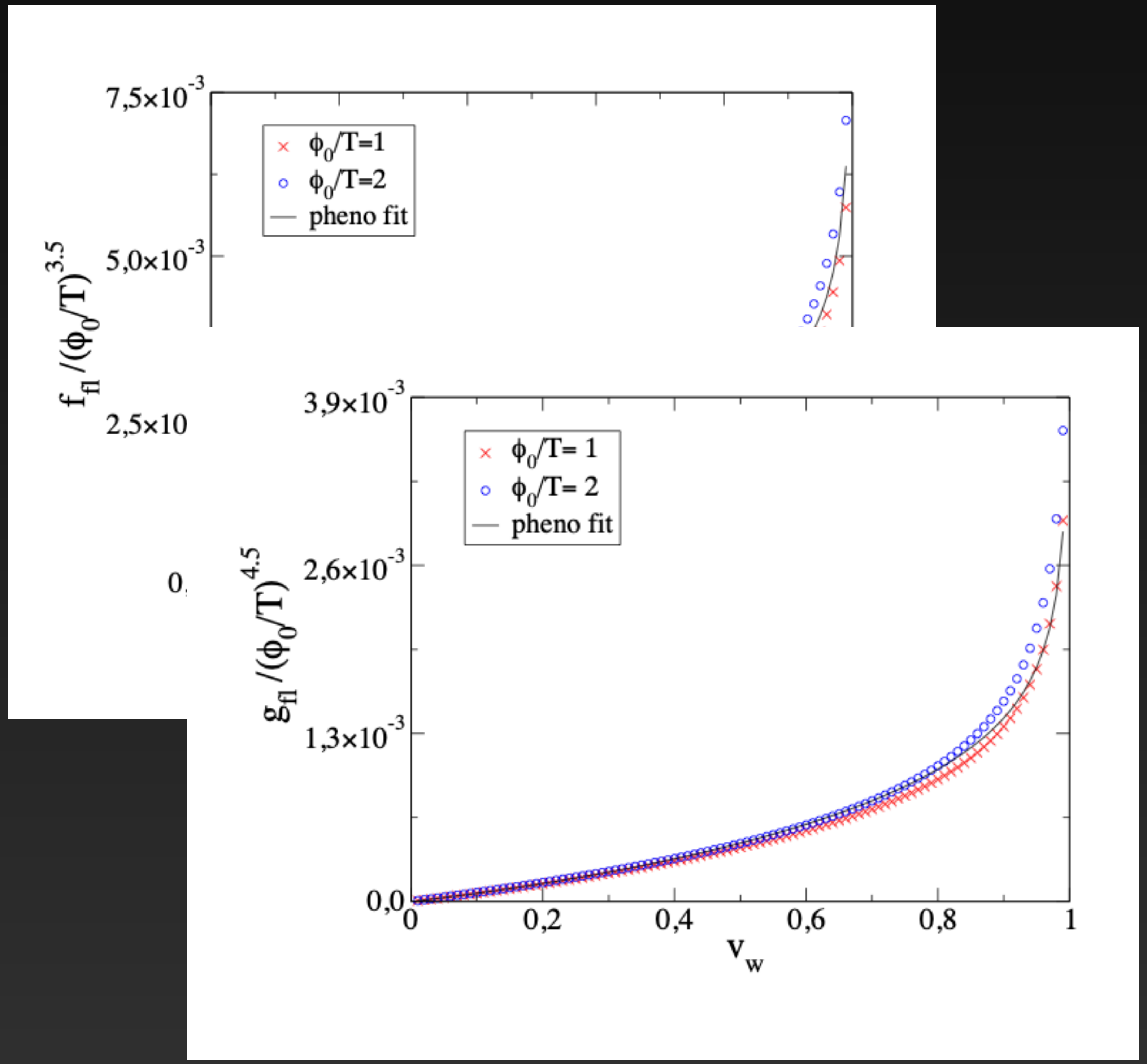

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$$\gamma_+^2 v_+^2 \omega_+ - \mathcal{F}_+ = \gamma_-^2 v_-^2 \omega_- - \mathcal{F}_-$$
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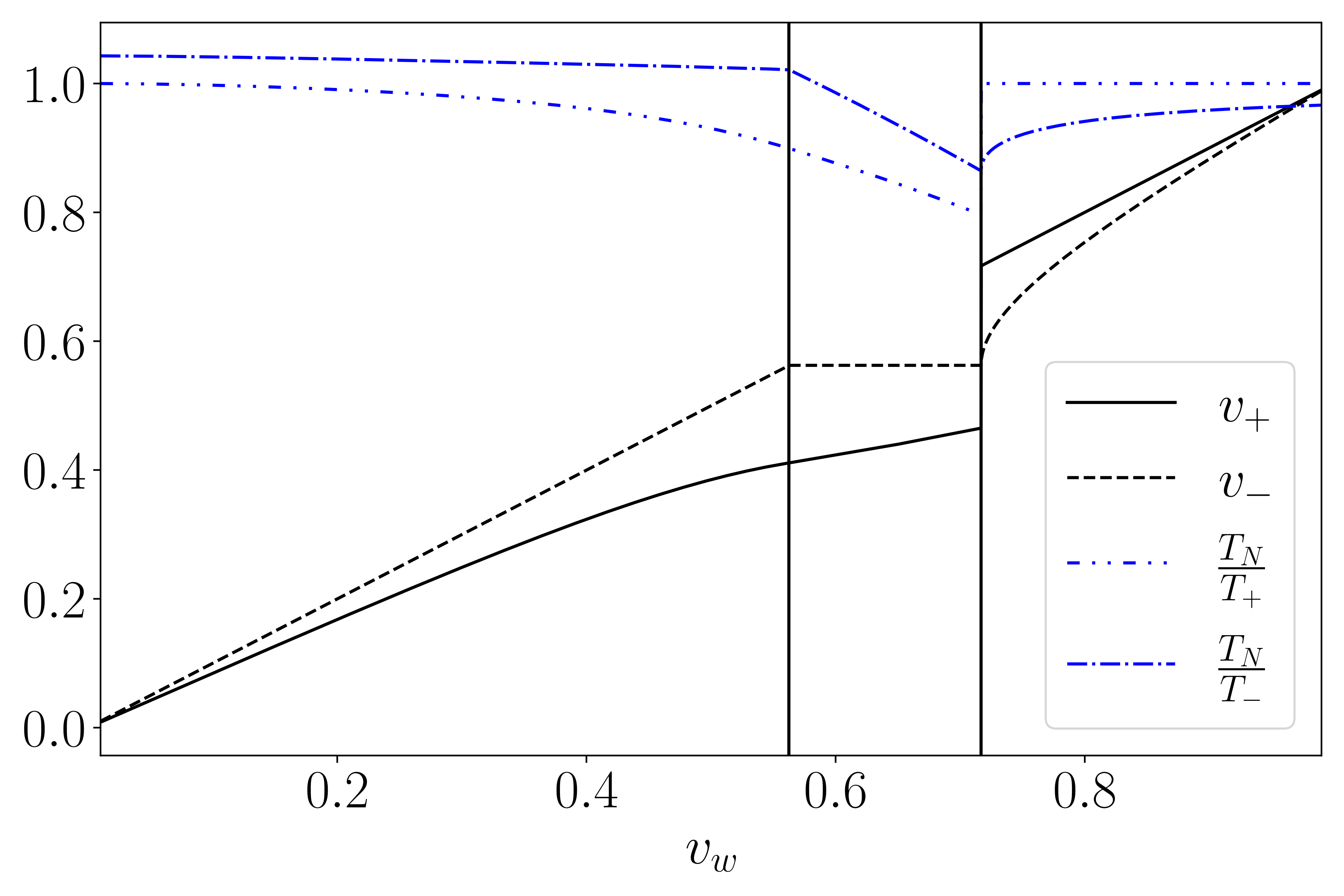

Thank you for your attention!