Second leptogenesis

a source of large discrepancy between baryon and lepton asymmetries

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(KAIST in Korea)

Based on

YeolLin Choijo[1], KE[1], Yechan Kim[1], Hye-Sung Lee[1]

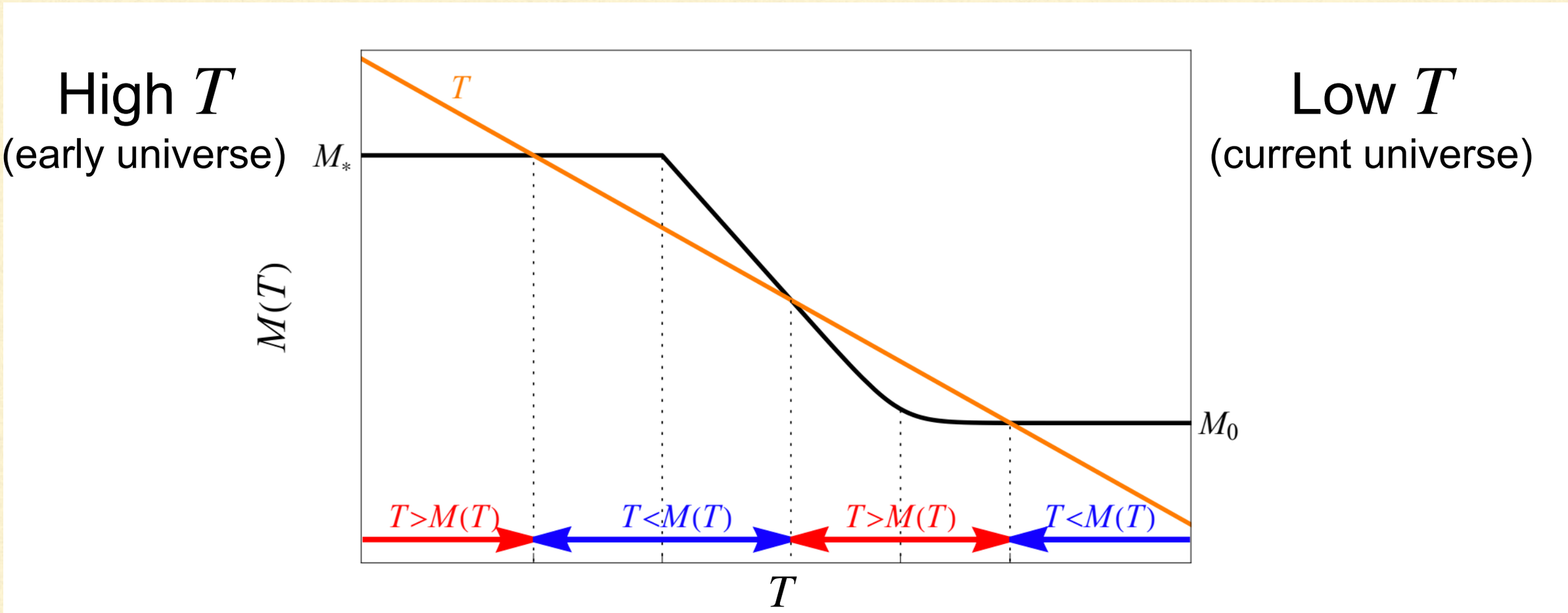
arXiv:2311.16672 [hep-ph].

1. KAIST

We proposed

a new scenario of leptogenesis

via decoupling of heavy neutrino w/ temperature-dependent mass



$M(T)$ is given by the coupling with wave dark matter

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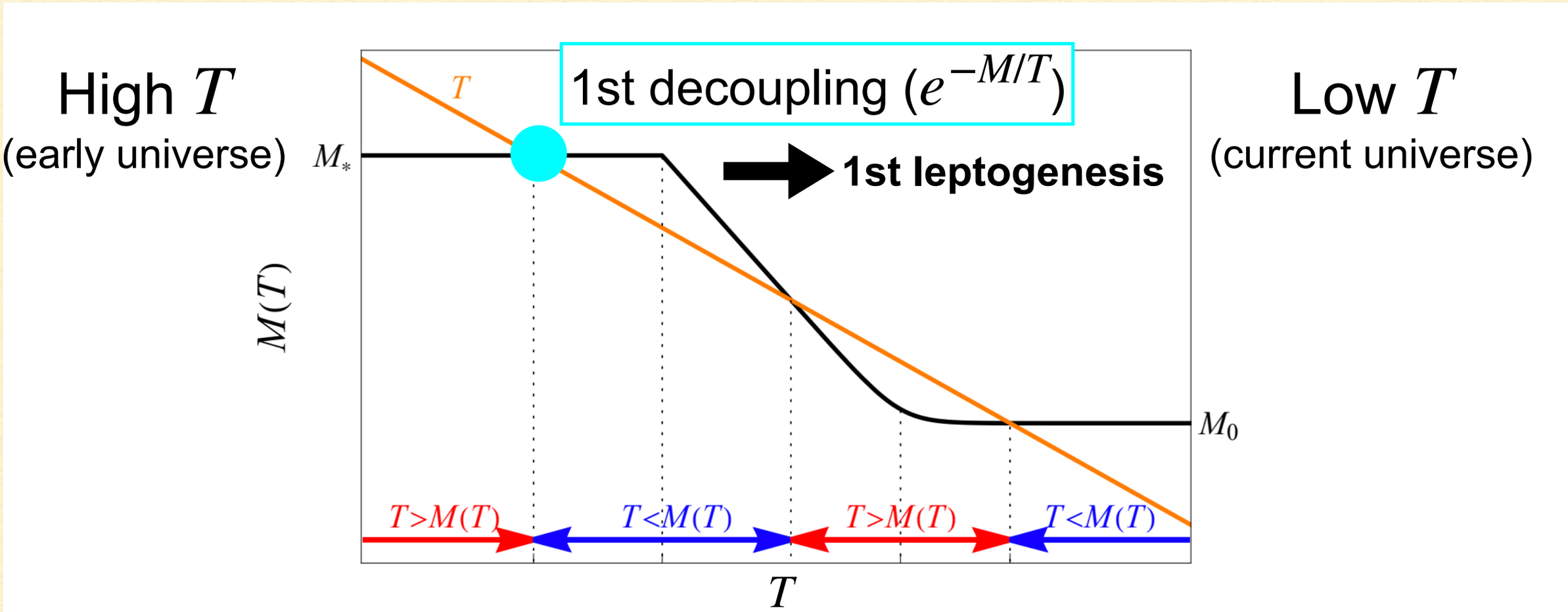

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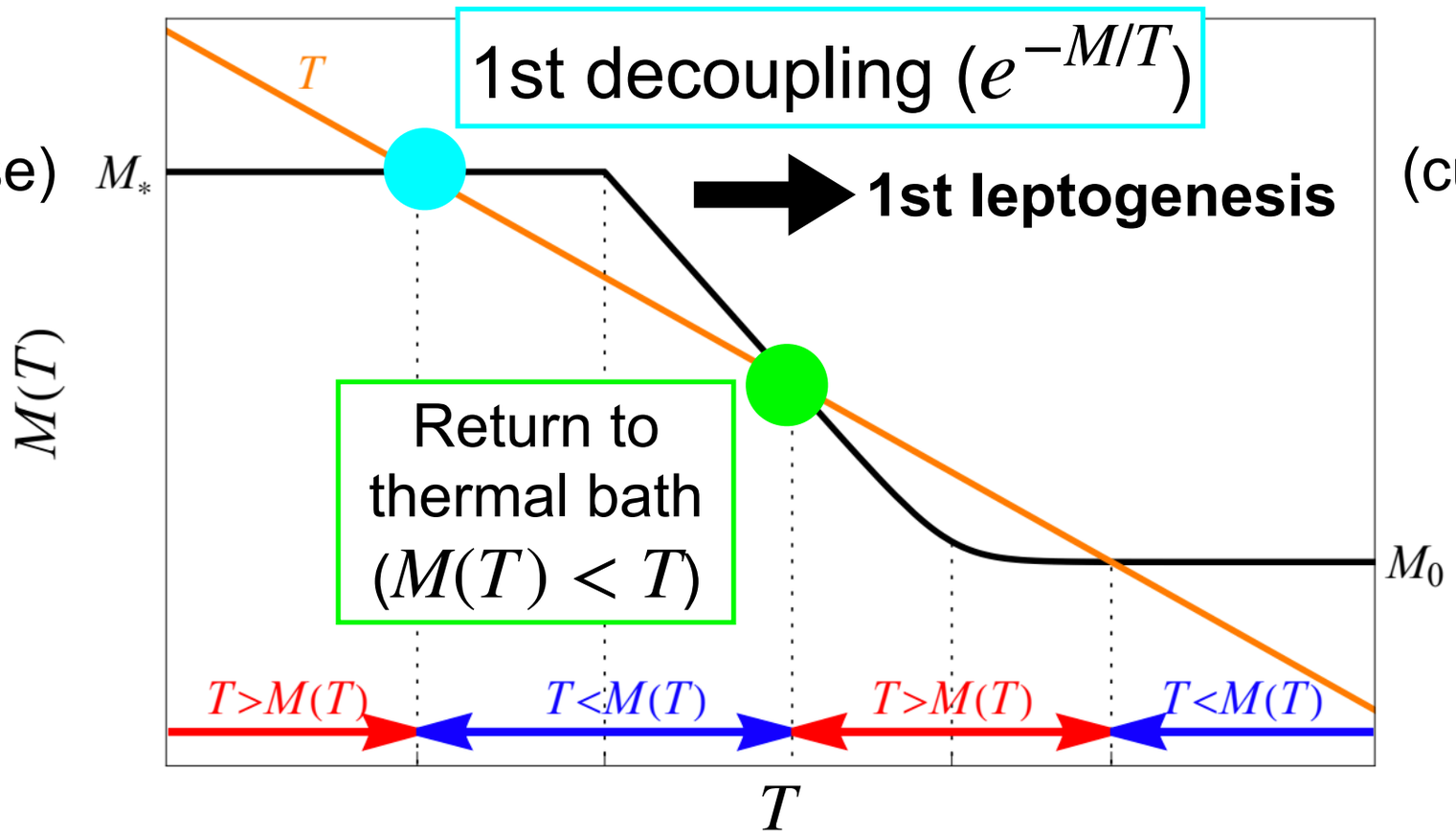

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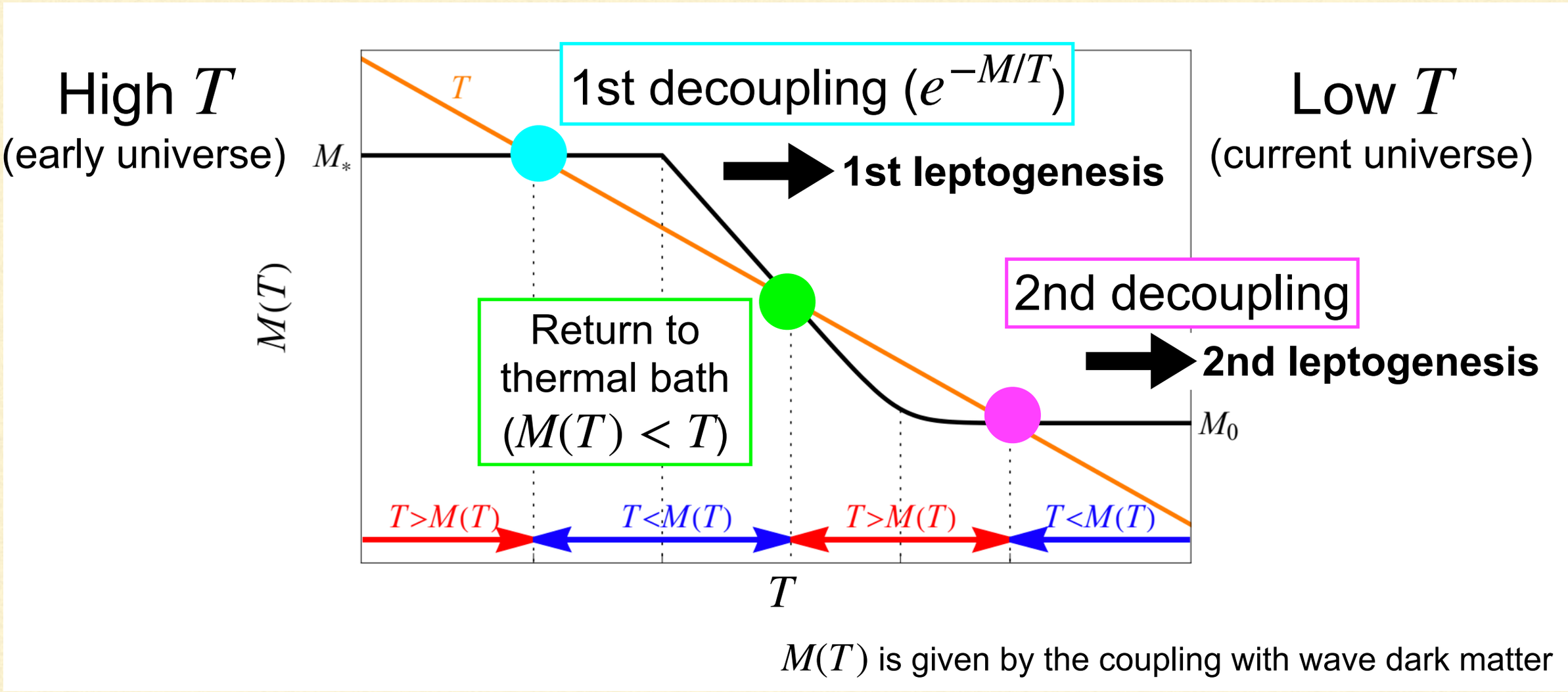

$M(T)$ is given by the coupling with wave dark matter

$M(T)$ leads two times decouplings

→ Two times leptogenesis!

Why two times leptogenesis?

- It can lead to **Large lepton asymmetry**

baryon-to-photon ratio

$$\eta_B = 6.1 \times 10^{-10}$$

Planck (2018)
JCAP 03 (2020) 010

10^8 **difference!**

at 2.5σ

lepton-to-photon ratio

$$\eta_L = 7.5 \times 10^{-2}$$

EMPRESS (2023)
^{4}He abundance observation

Most baryogenesis mechanisms cannot explain it
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- 1st lepogenesis

BEFORE the sph. decoupling

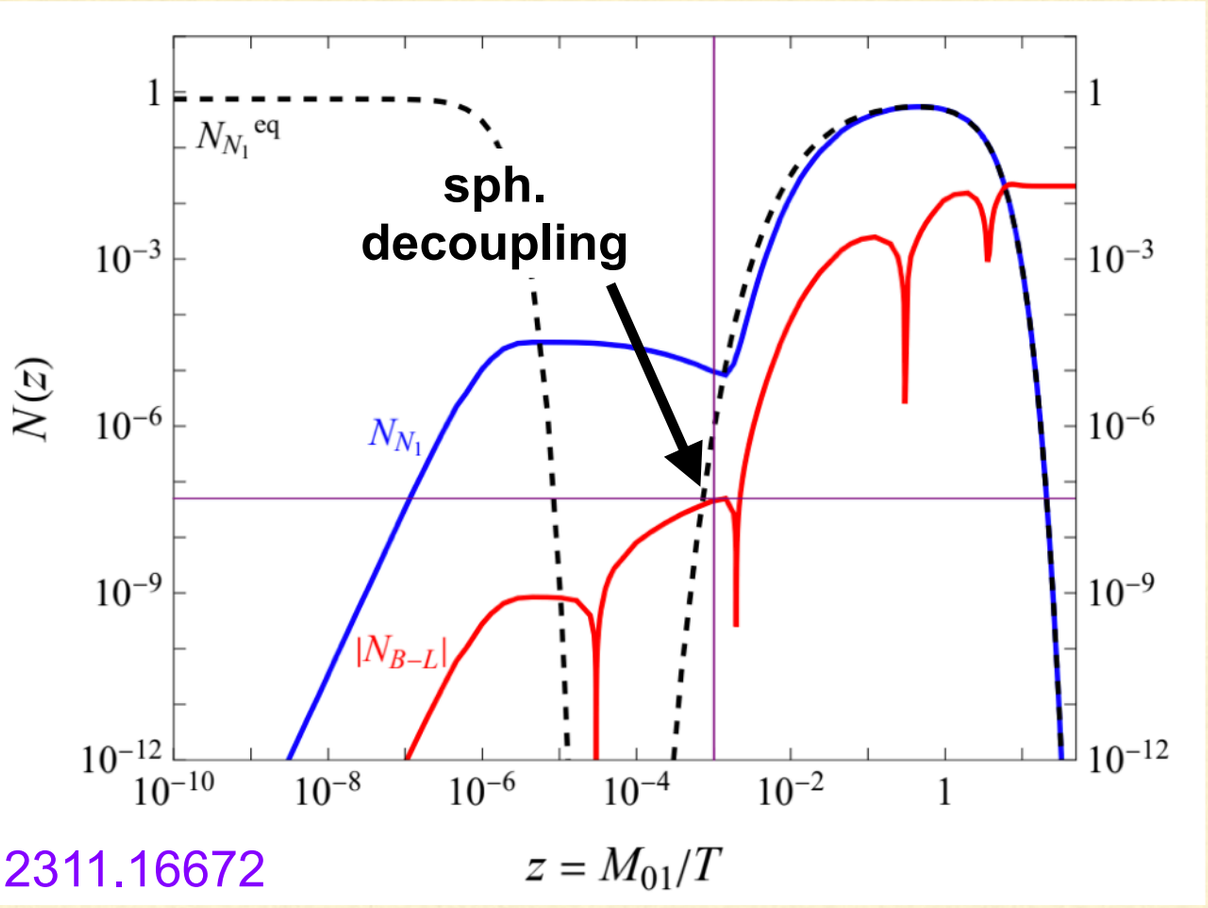
$$\not{L} \xrightarrow[\text{sph.}]{} \not{B} \quad \left(\begin{array}{c} \text{Finally} \\ \not{L} \simeq \not{B} \end{array} \right)$$

- 2nd lepogenesis

AFTER the sph. decoupling

$\not{L}$ remains! No sphaleron

Extra $\not{L}$ ⟶ $\eta_L \gg \eta_B$



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