

フェルミ粒子

ゲージ粒子

フェルミ粒子			ゲージ粒子	
クォーク	第1世代	第2世代	第3世代	
	<div>u</div> <div>アップ クォーク</div>	<div>c</div> <div>チャーム クォーク</div>	<div>t</div> <div>トップ クォーク</div>	<div>γ</div> <div>光子</div>
	<div>d</div> <div>ダウン クォーク</div>	<div>s</div> <div>ストレンジ クォーク</div>	<div>b</div> <div>ボトム クォーク</div>	<div>g</div> <div>グルーオン</div>
レプトン				
	<div>e</div> <div>電子</div>	<div>μ</div> <div>ミュー粒子</div>	<div>τ</div> <div>タウ粒子</div>	<div>Z⁰</div> <div>W⁺</div> <div>W⁻</div> <div>ウィークボソン</div>
	<div>ν_e</div> <div>電子 ニュートリノ</div>	<div>ν_μ</div> <div>ミュー ニュートリノ</div>	<div>ν_τ</div> <div>タウ ニュートリノ</div>	
			ヒッグス粒子	
			<div>H</div> <div>ヒッグス粒子</div>	

Pre-preparatory Phase

Main Preparatory Phase

Construction / Operation Phase

政府間議論

政府間交渉

ILC Laboratory

European Strategy for
Particle Physicsのアップデート

日本学術会議のマスタープラン

政府間交渉の開始

政府間合意

建設

運転

ILCの活動

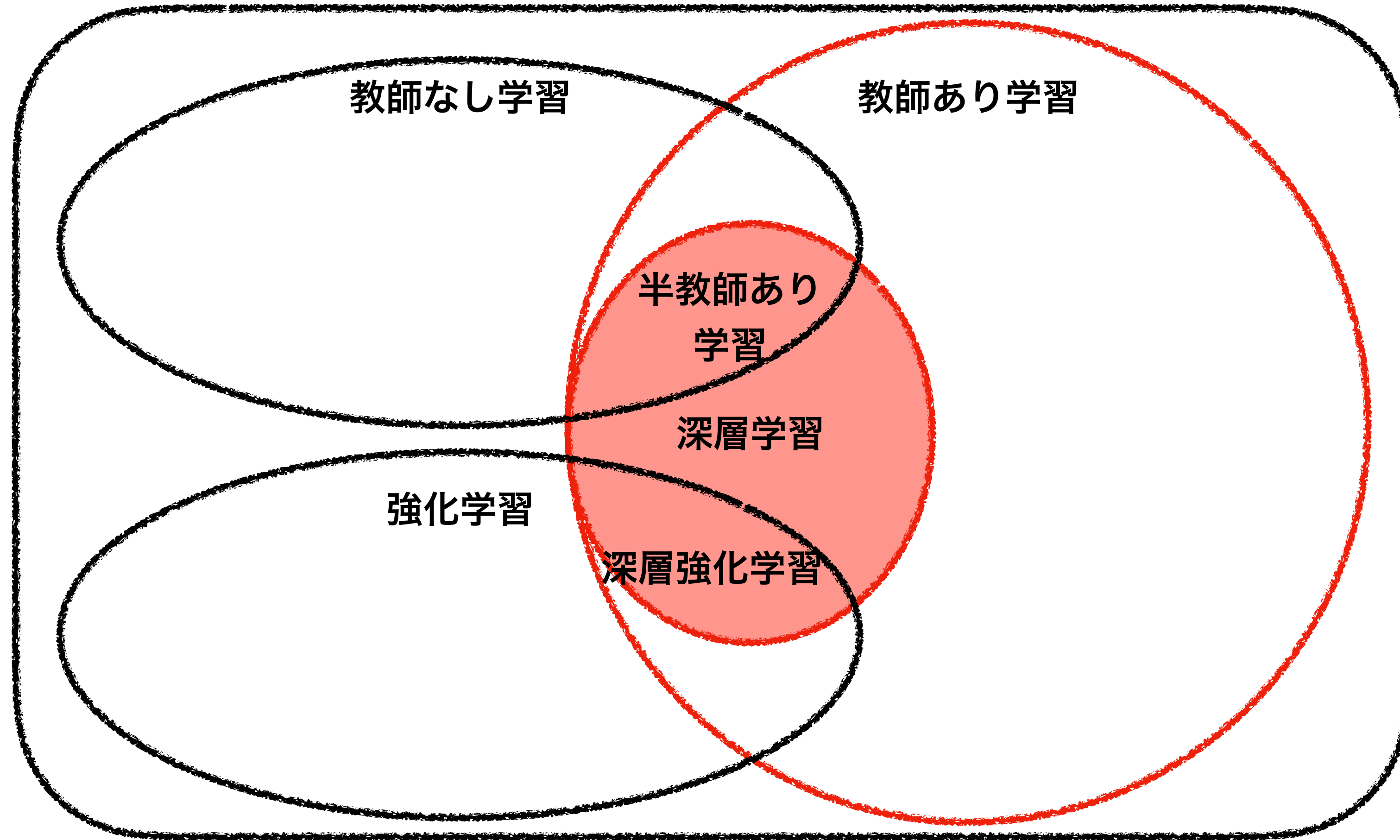
ILC準備研究所

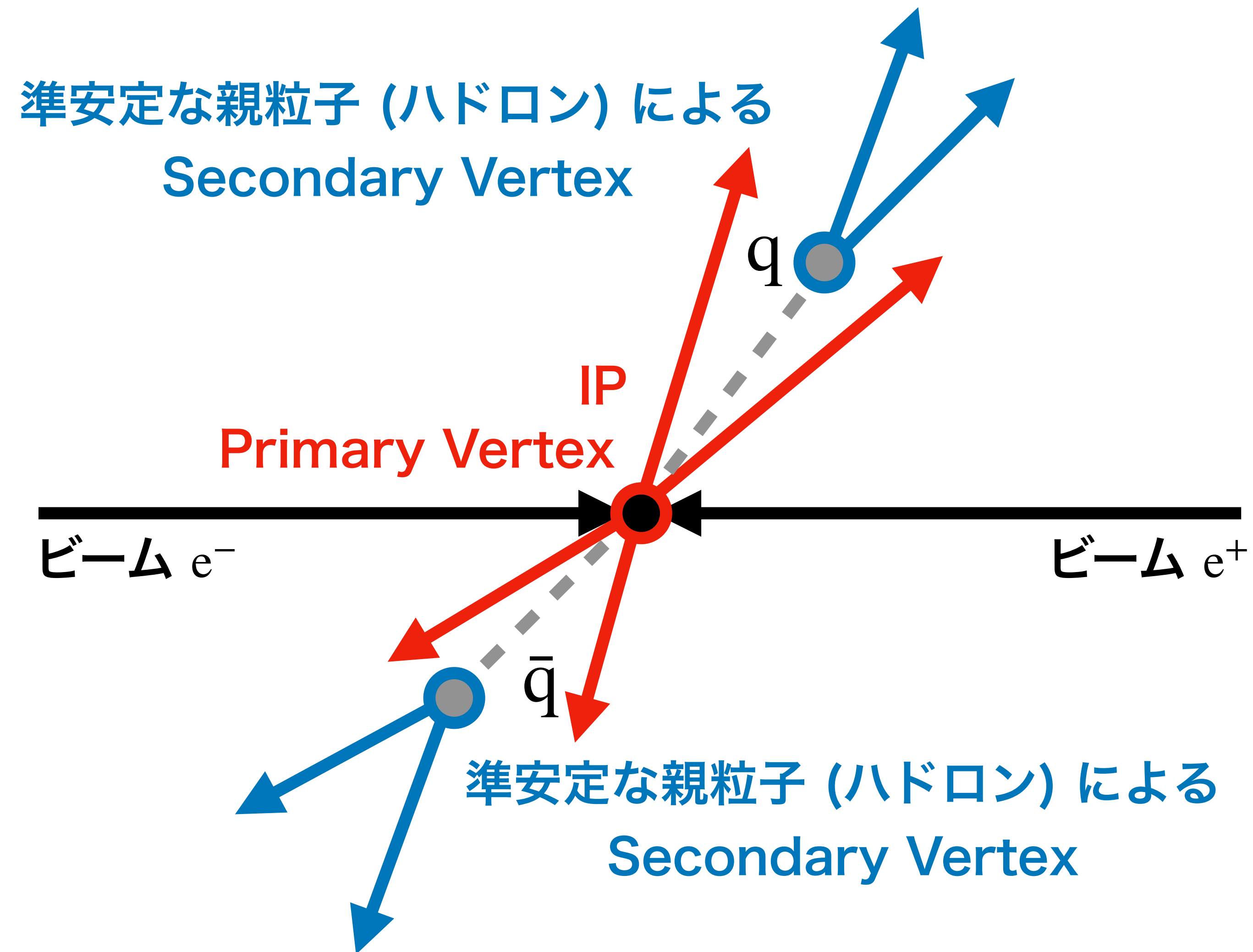
Light-
weight
MoUs

Detailed
MoUs

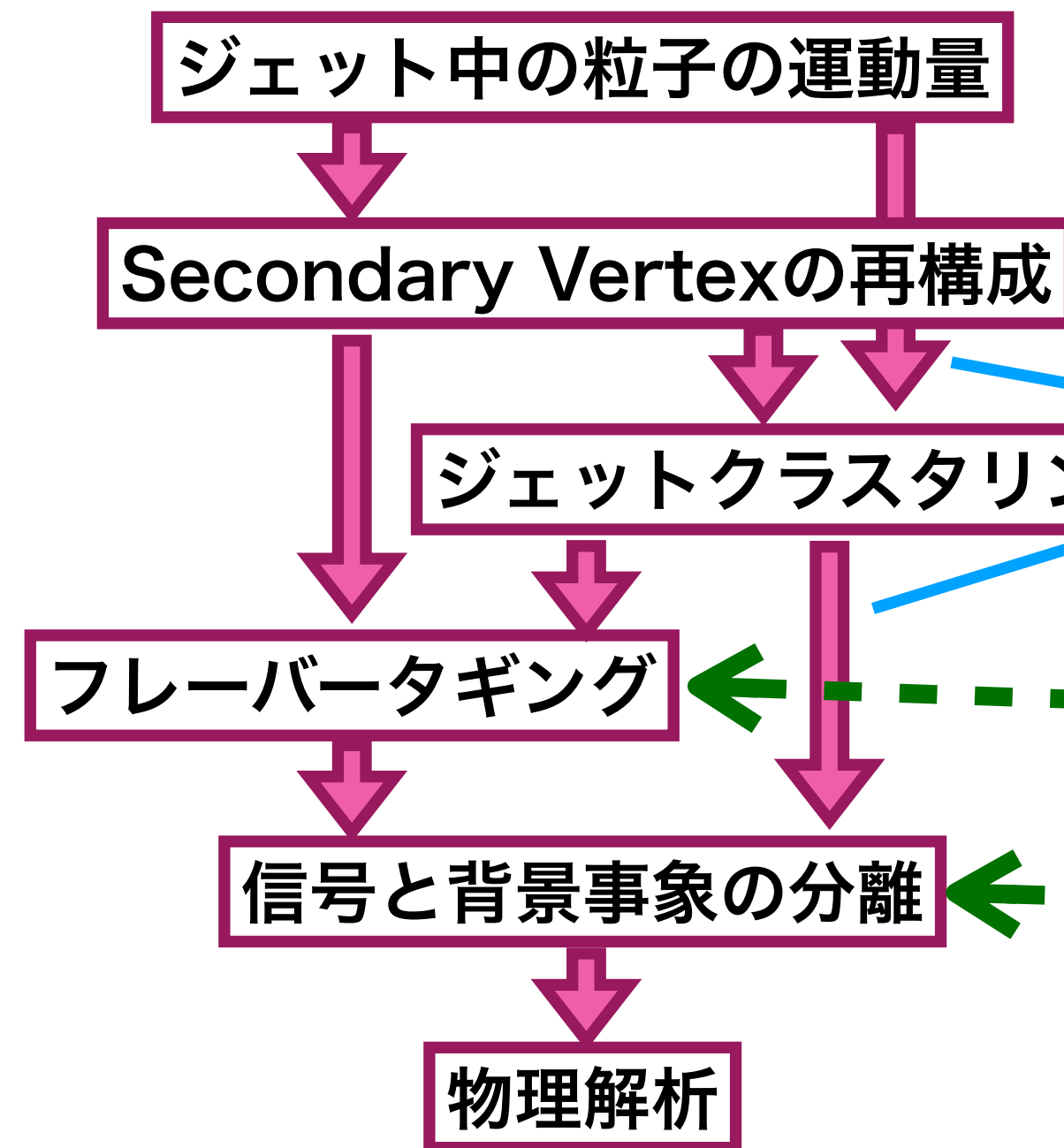
- LCB / LCC
- KEK Planning Office for ILC
etc.

機械学習

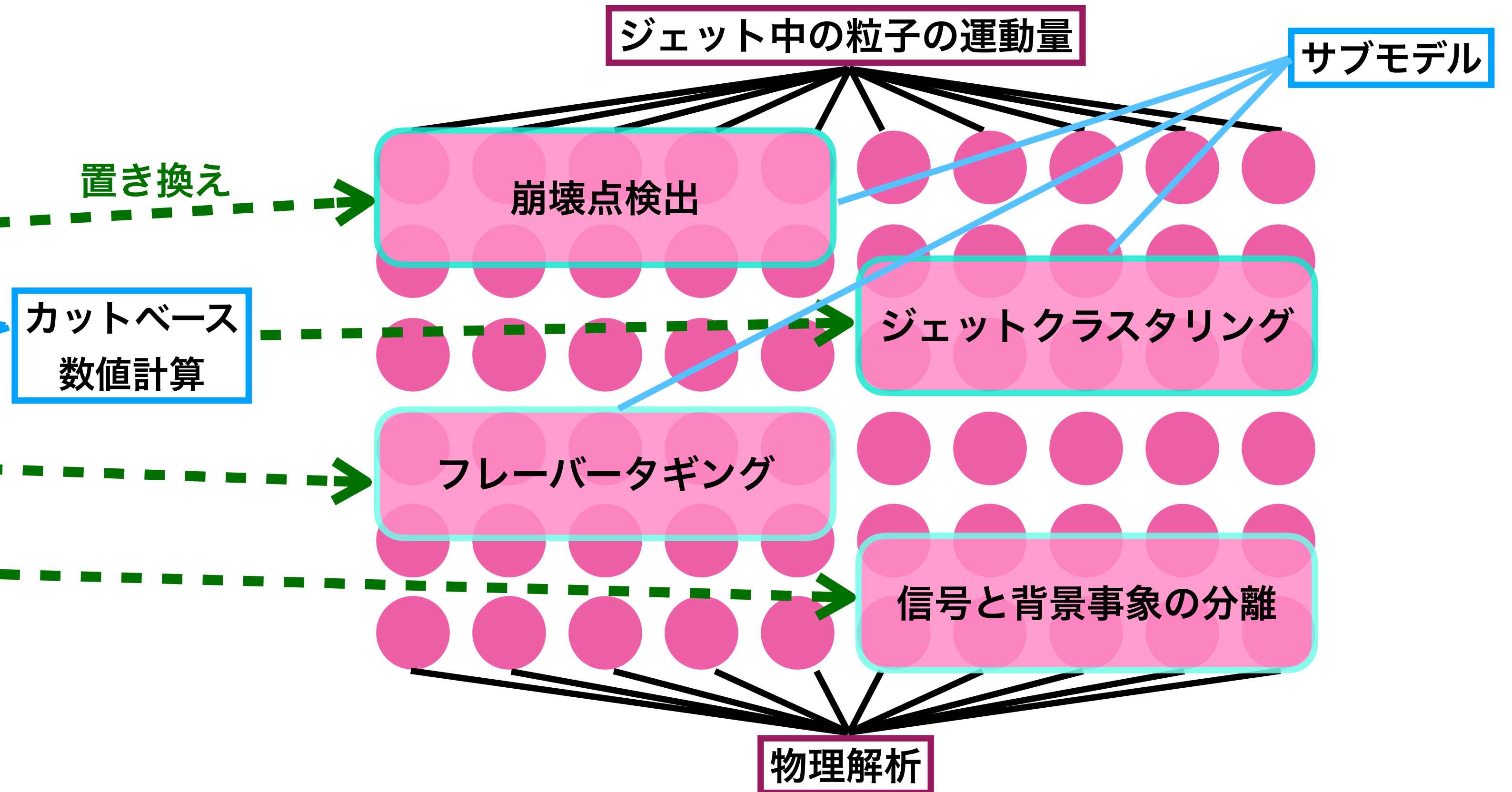




現行の手法

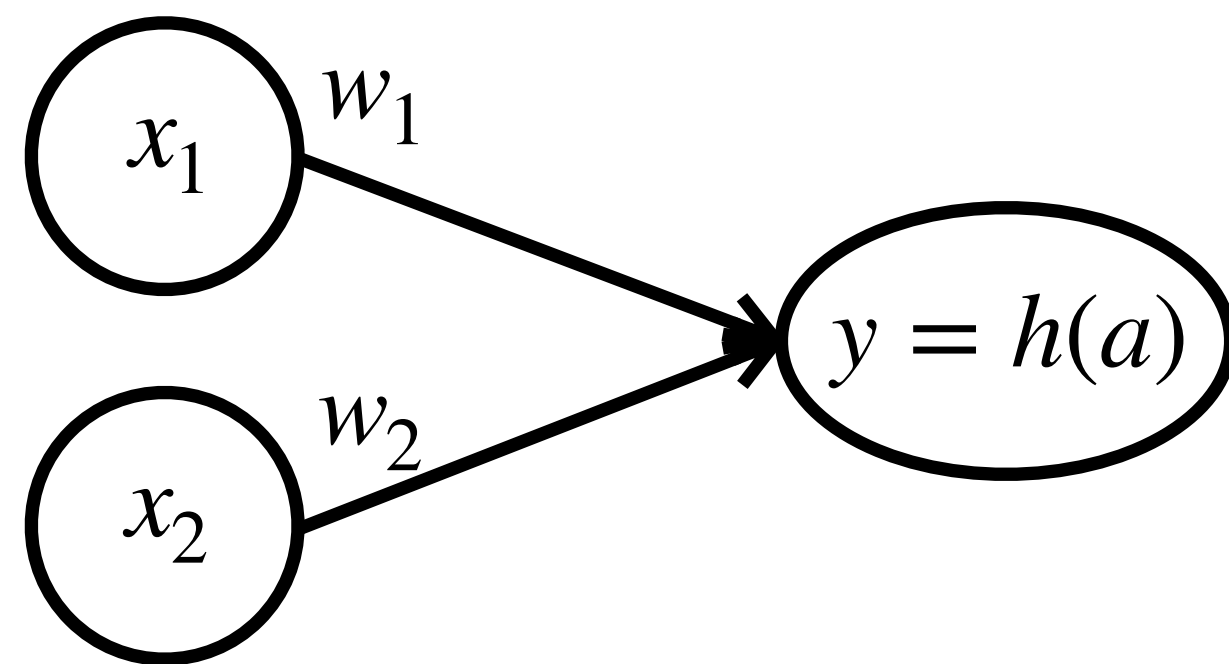


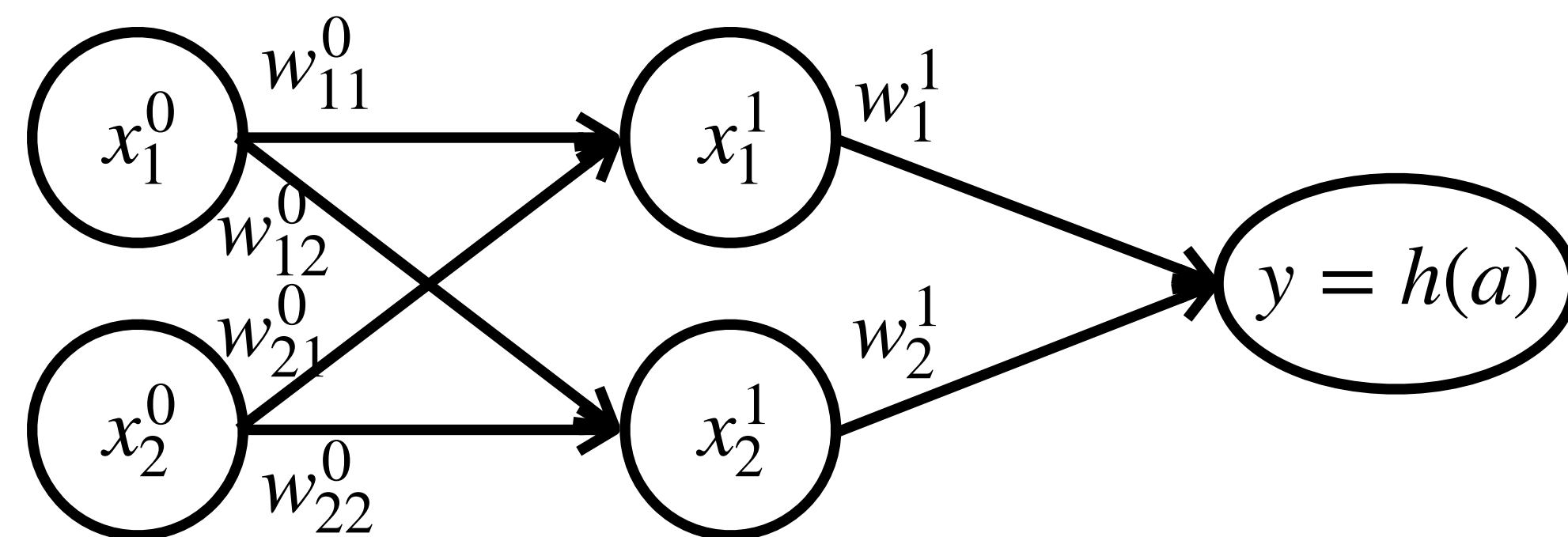
深層学習



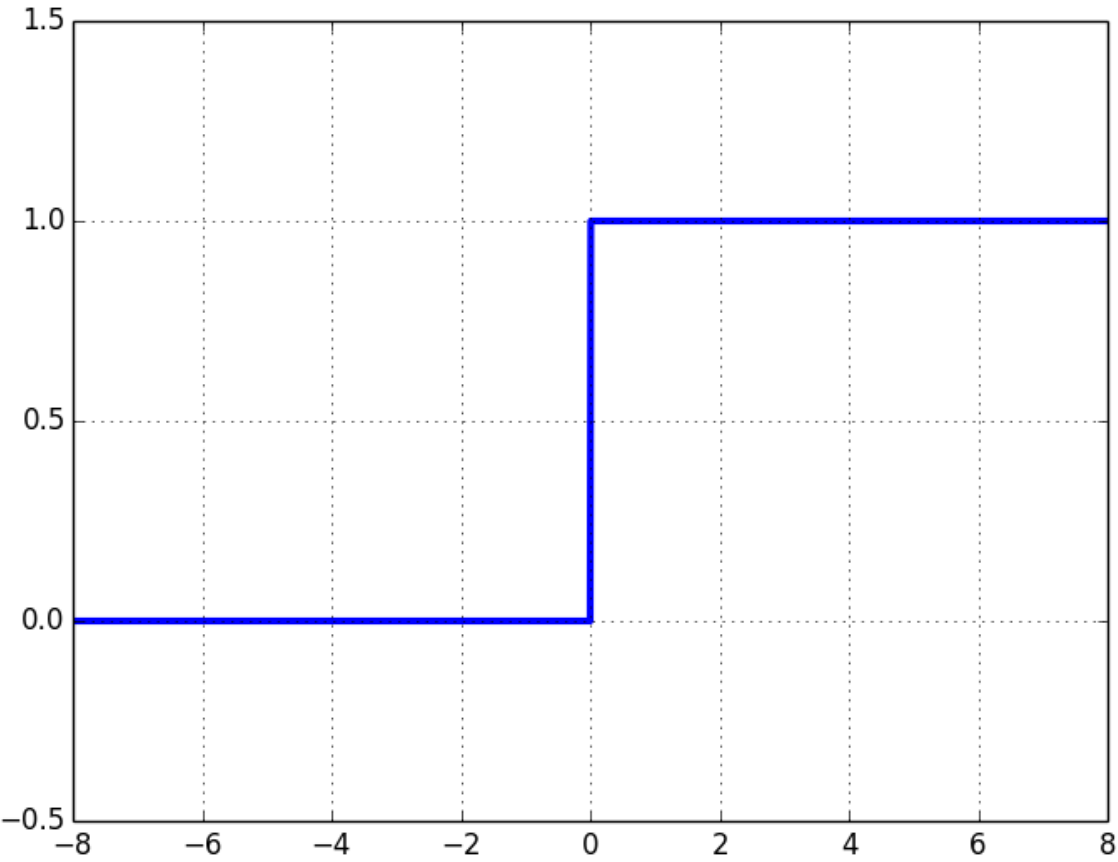
置き換え

カットベース
数値計算

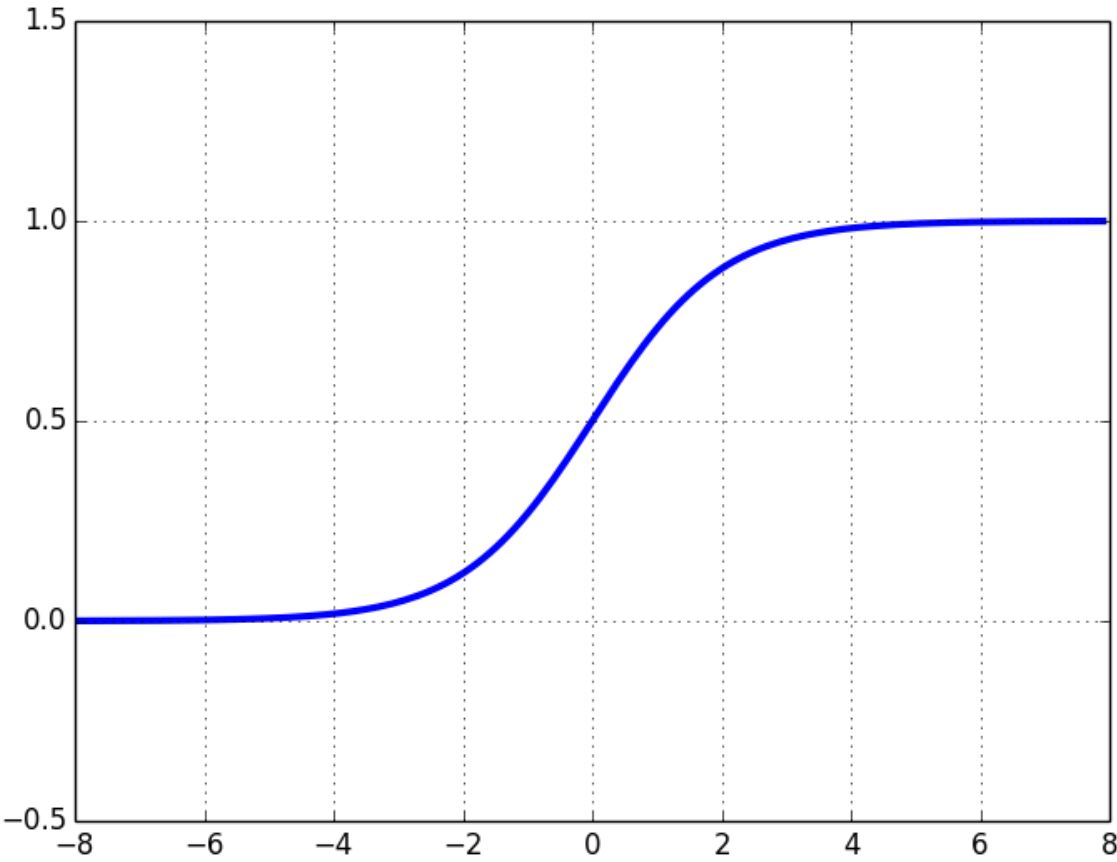




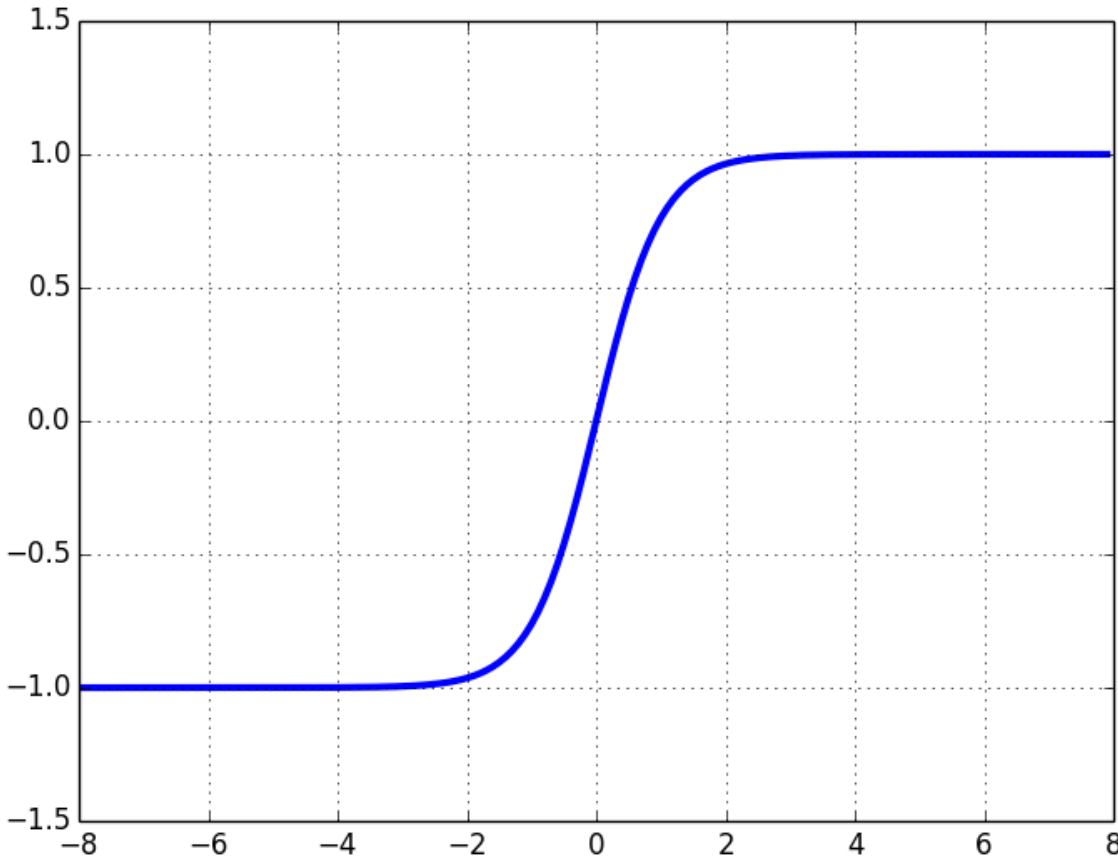
階段関数



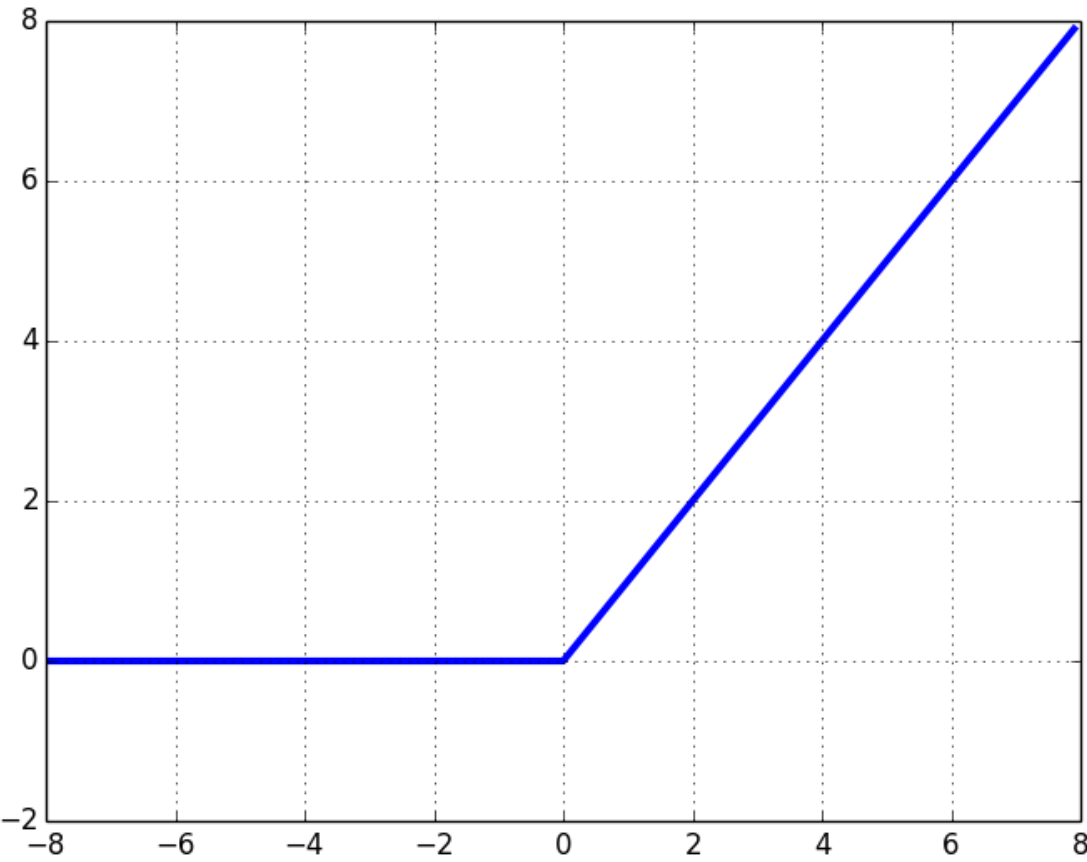
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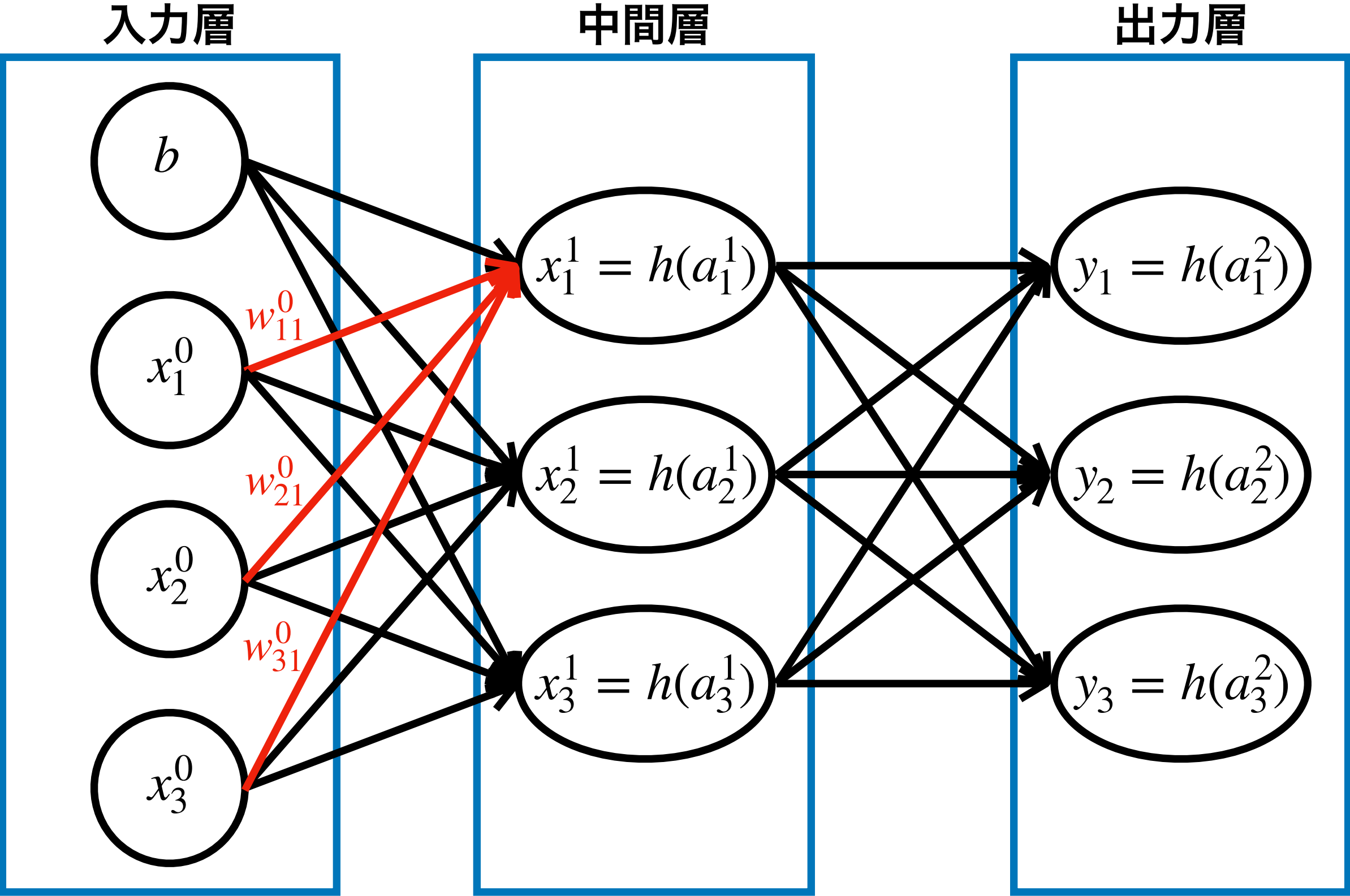


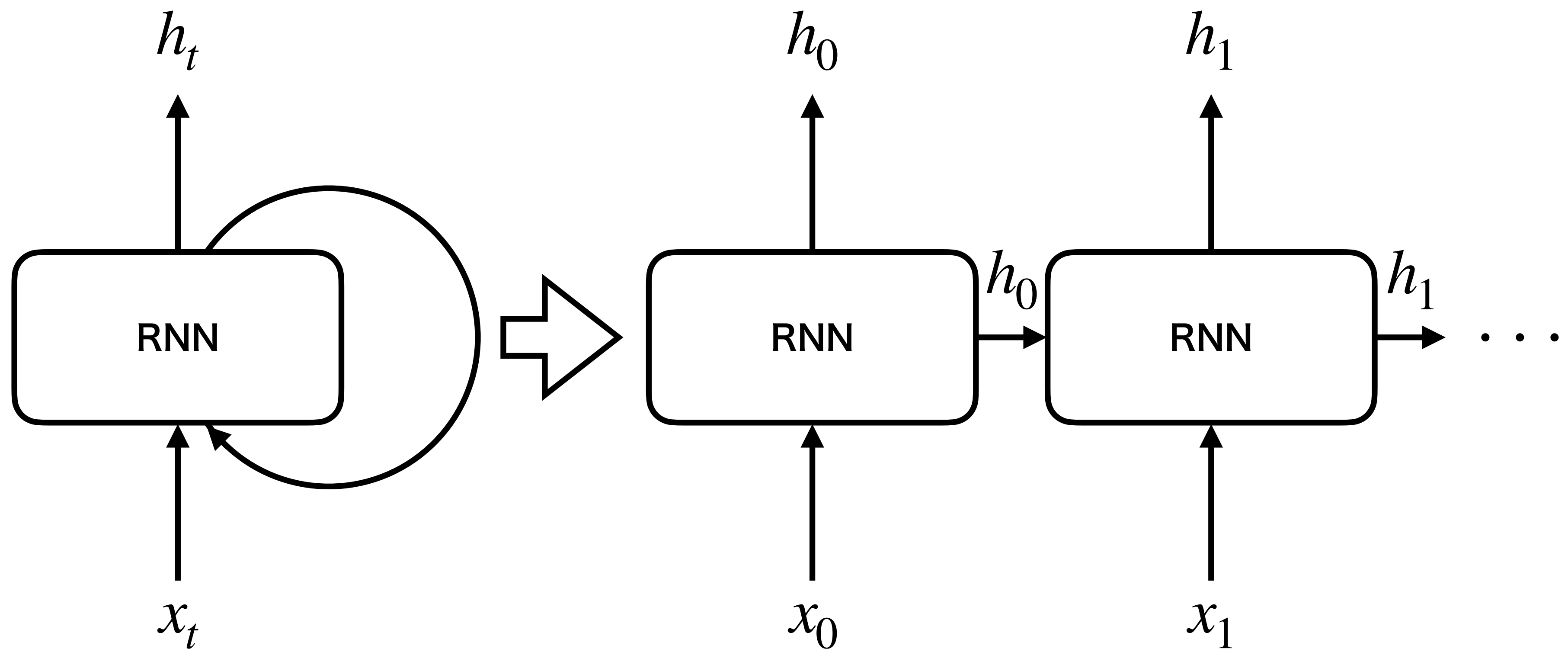
tanh関数

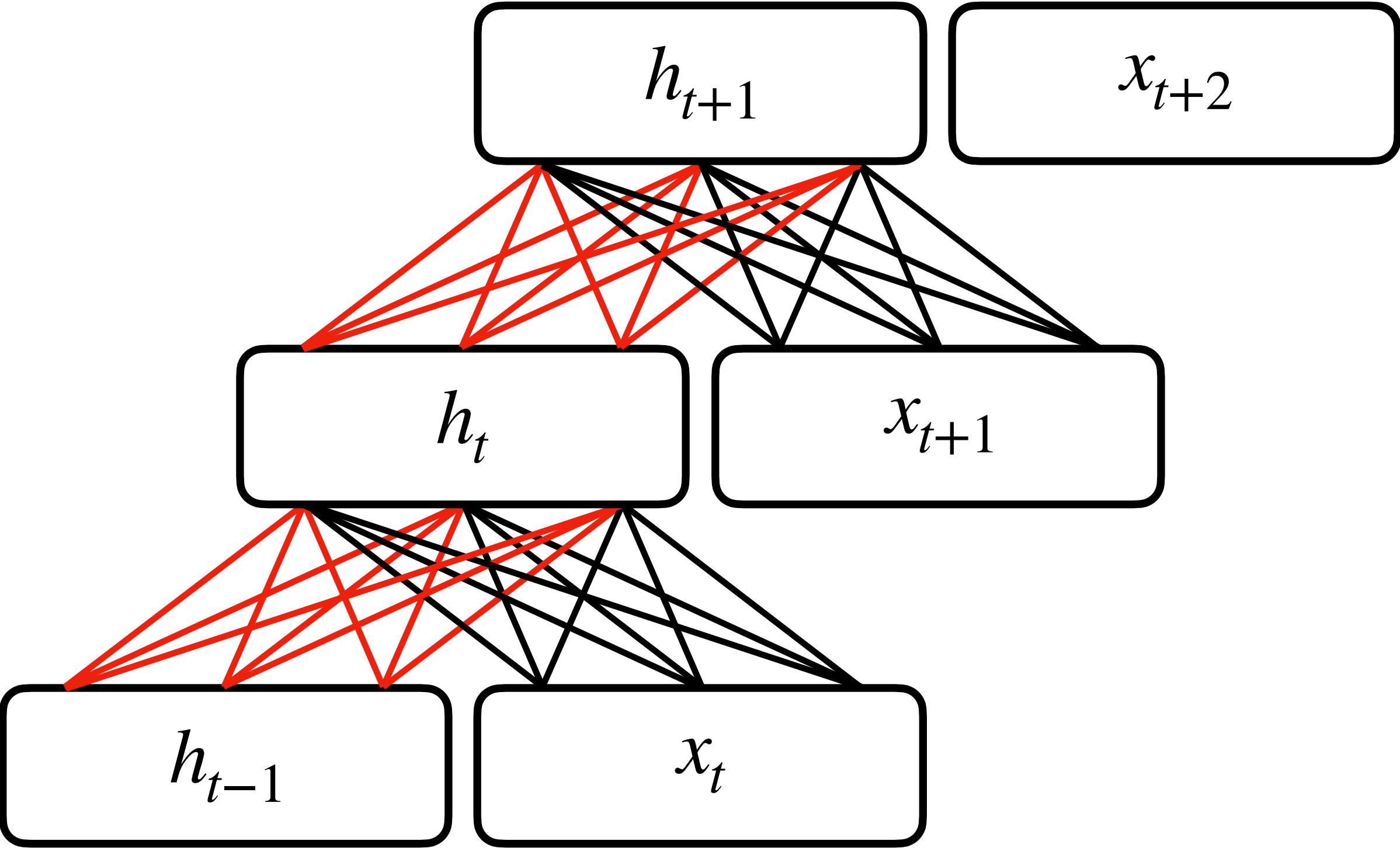


ReLU関数

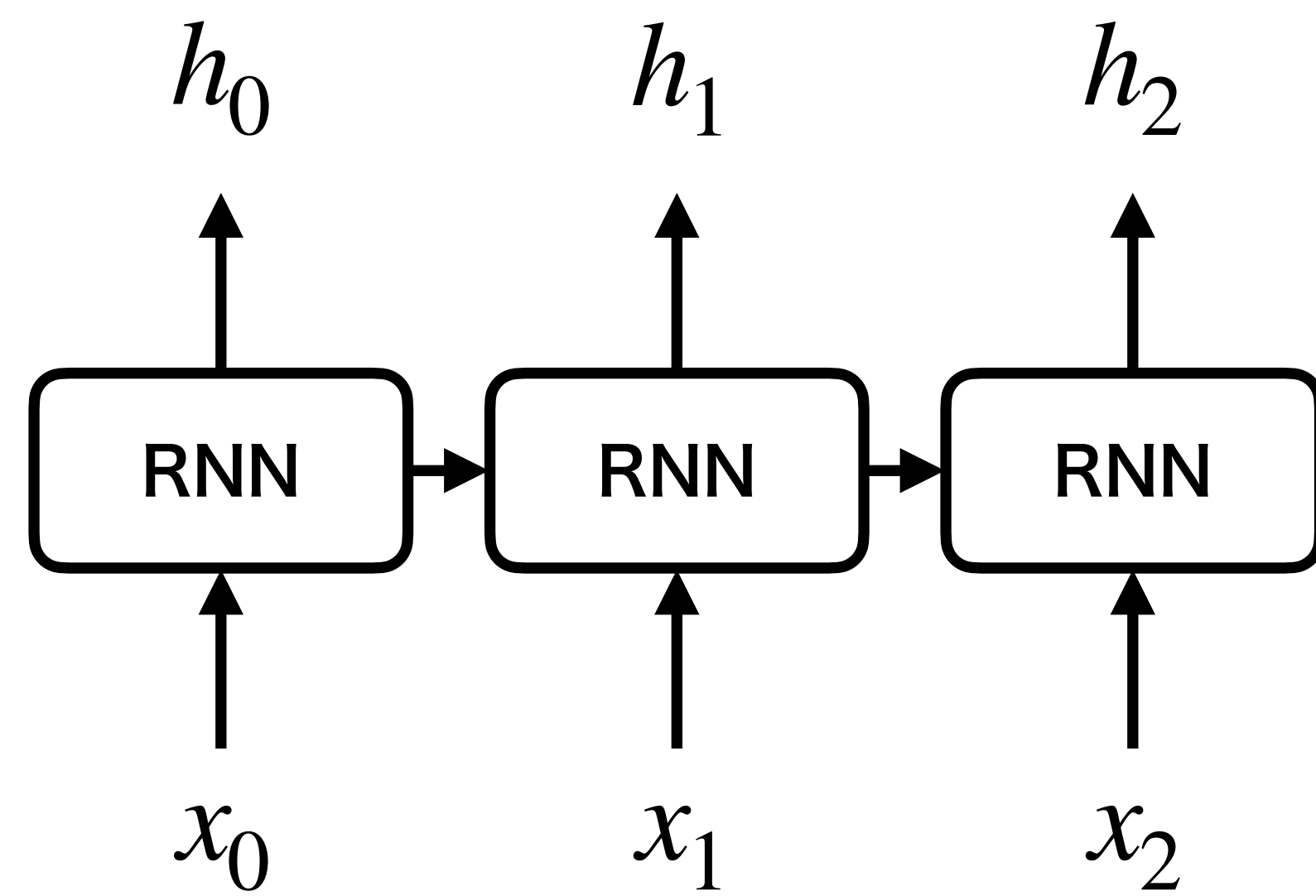




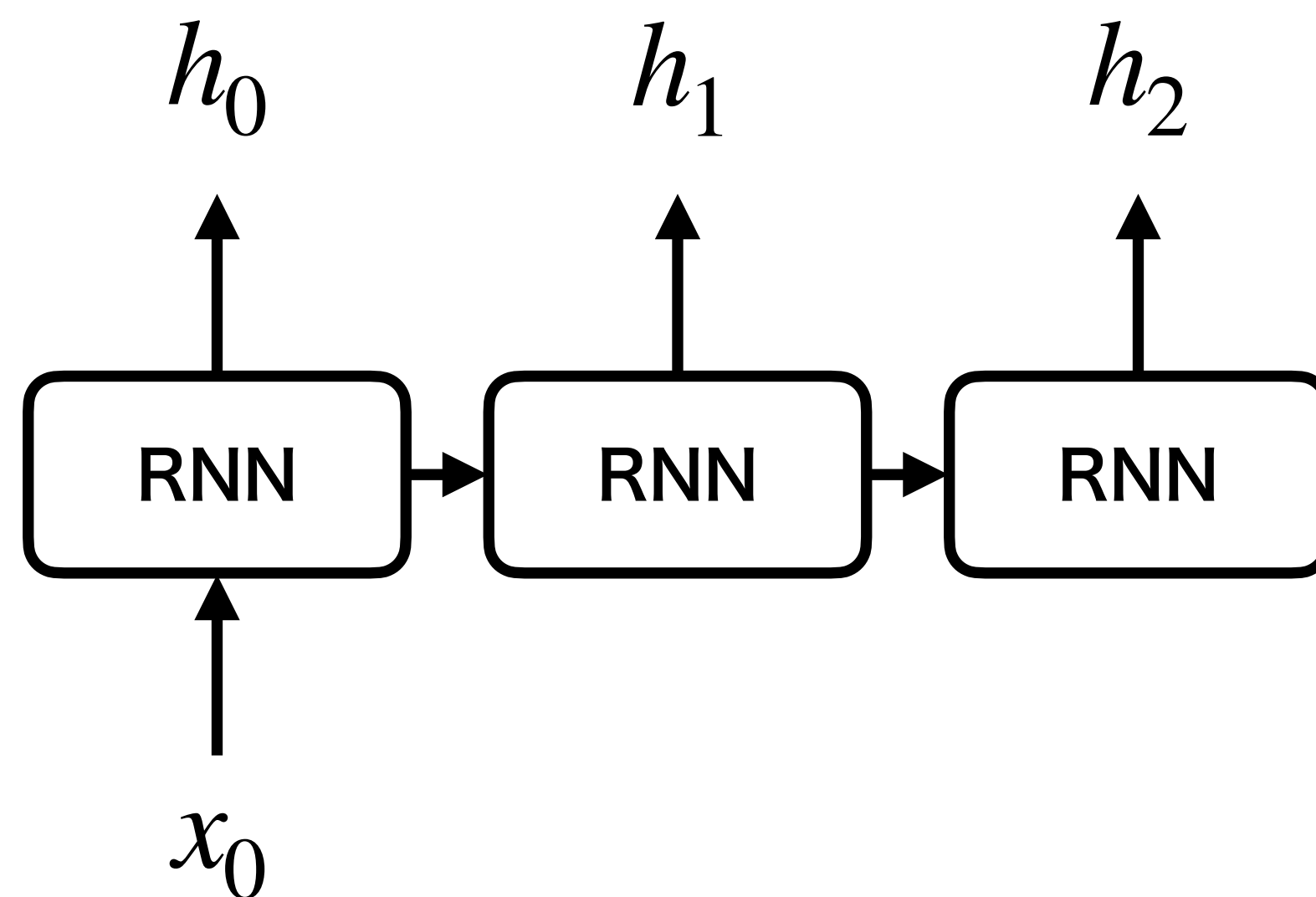




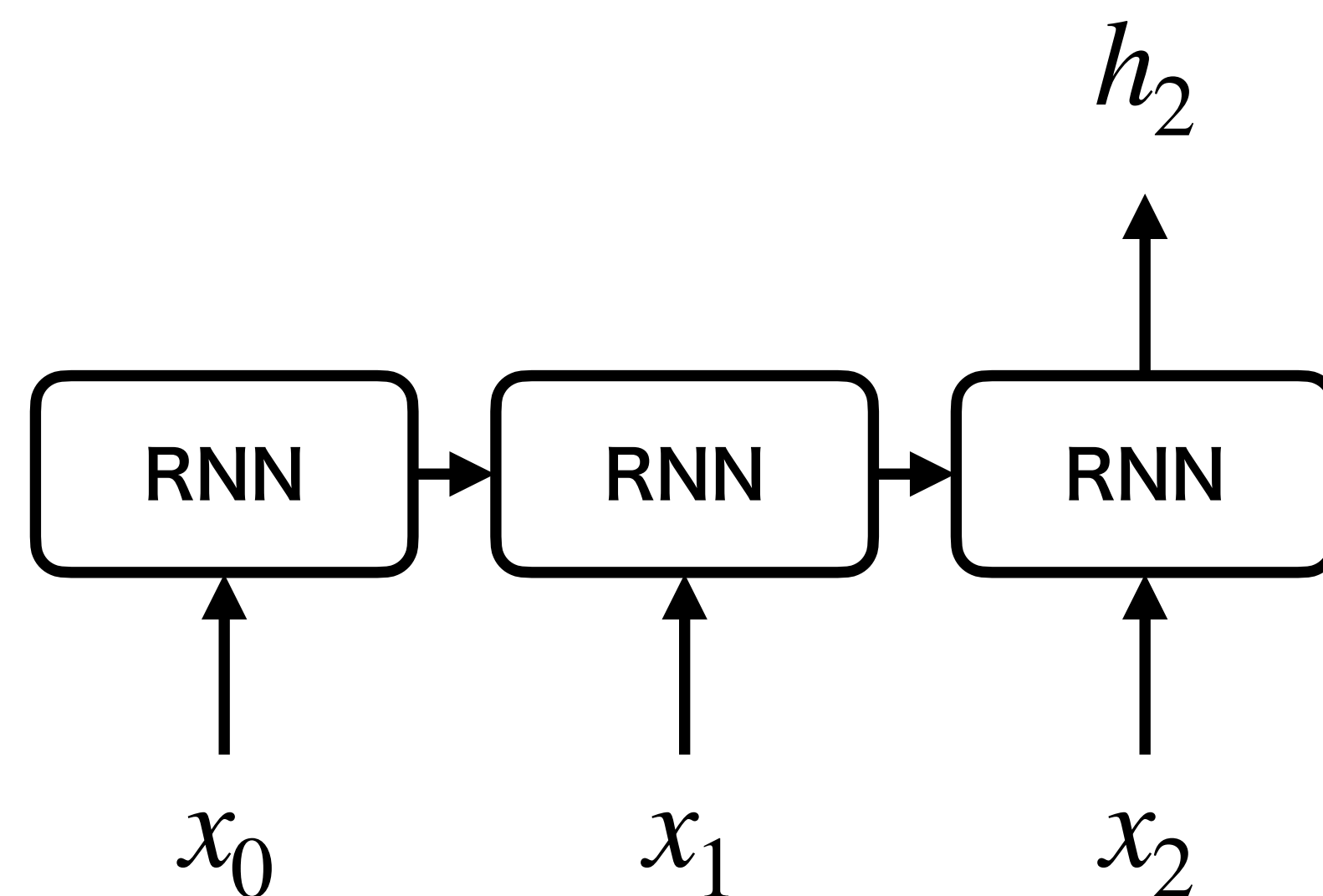
Many to Many

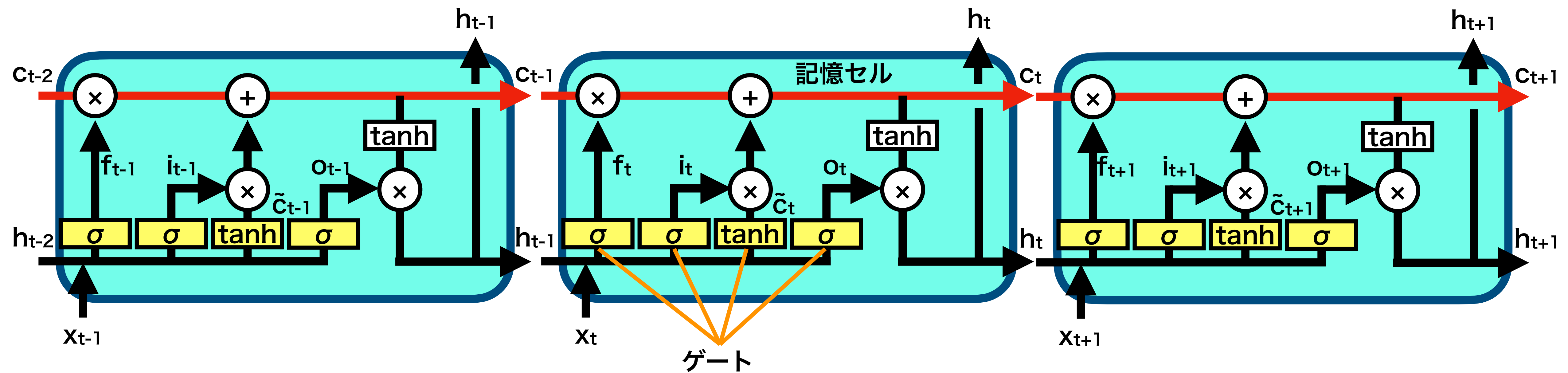


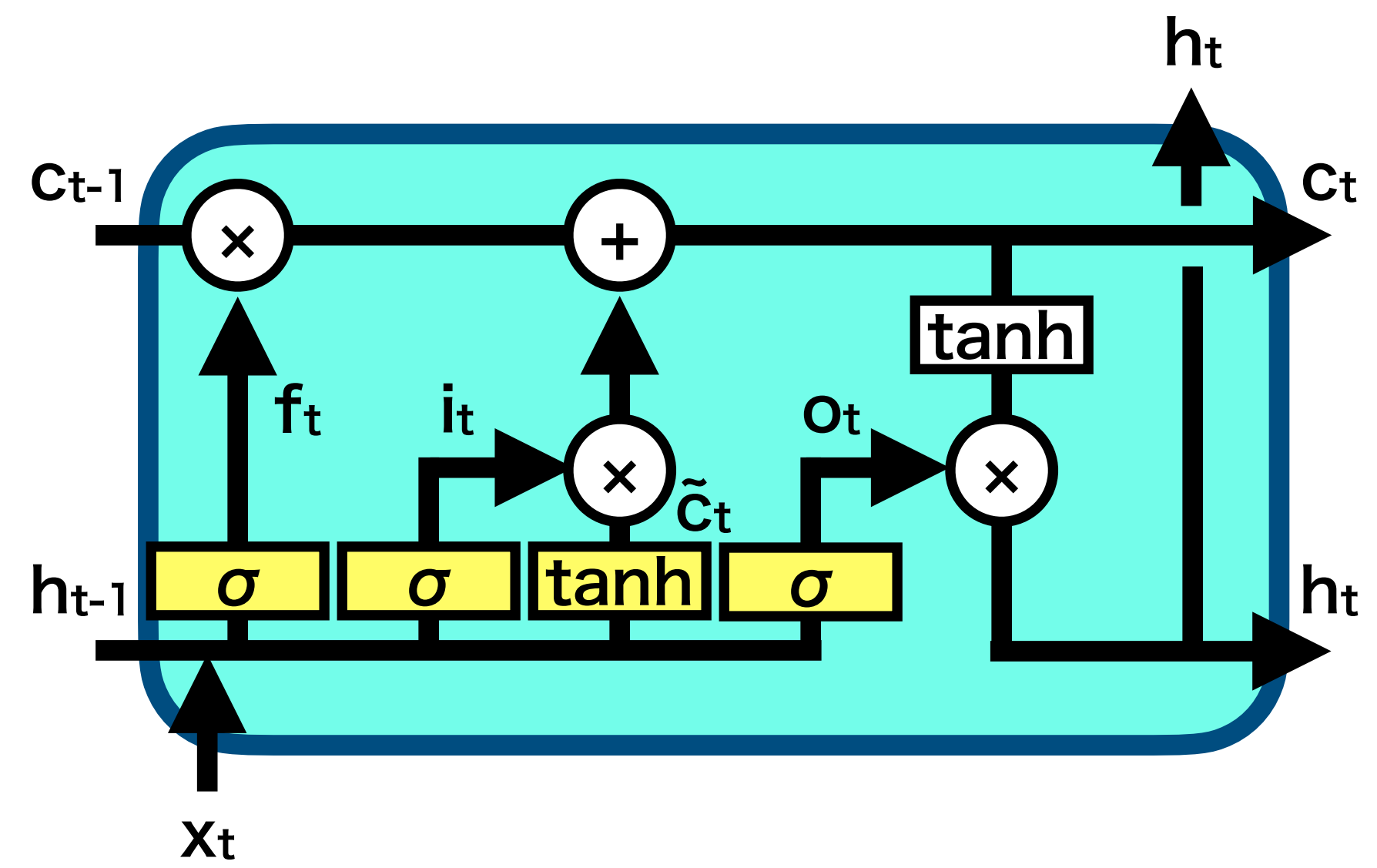
One to Many

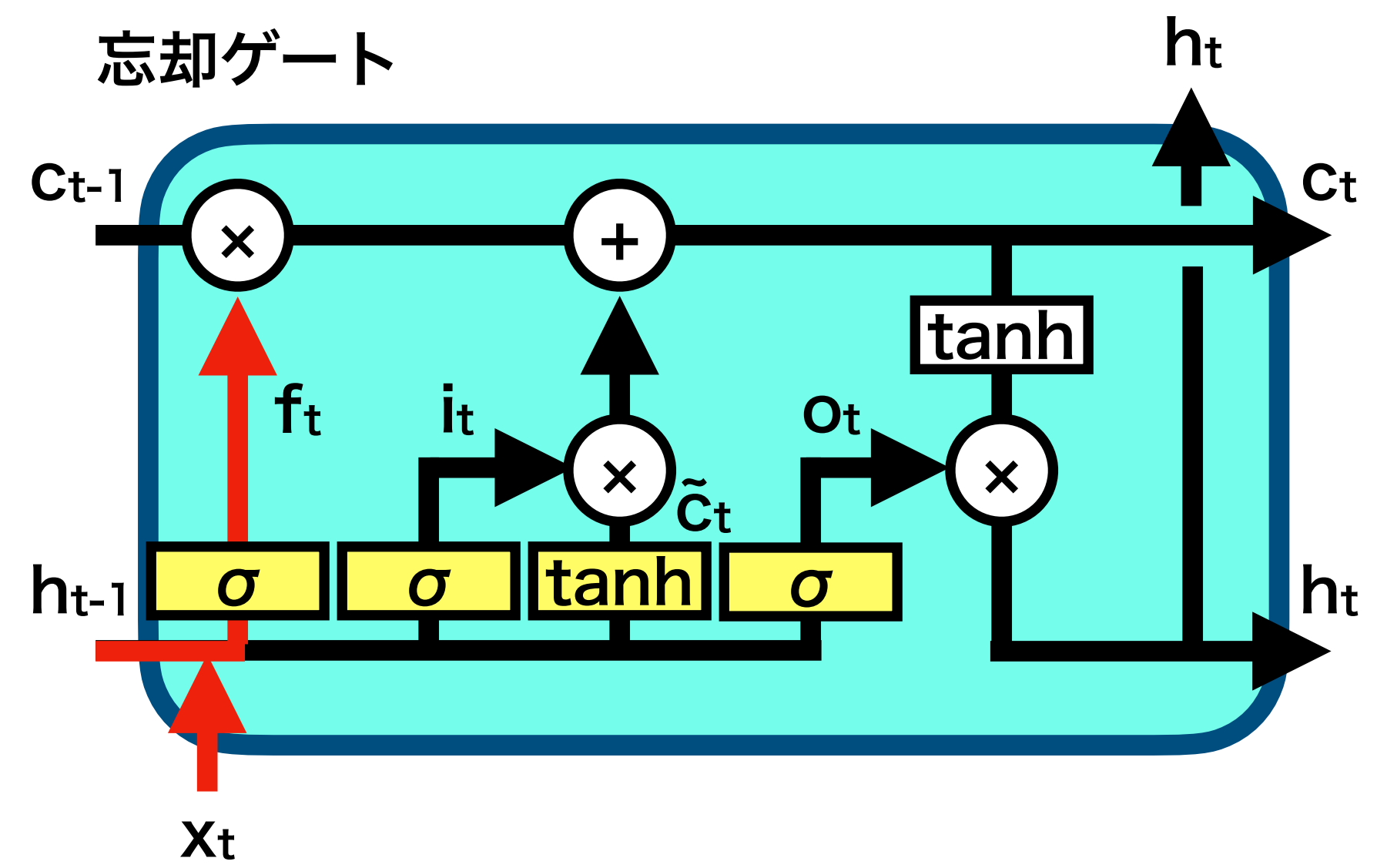


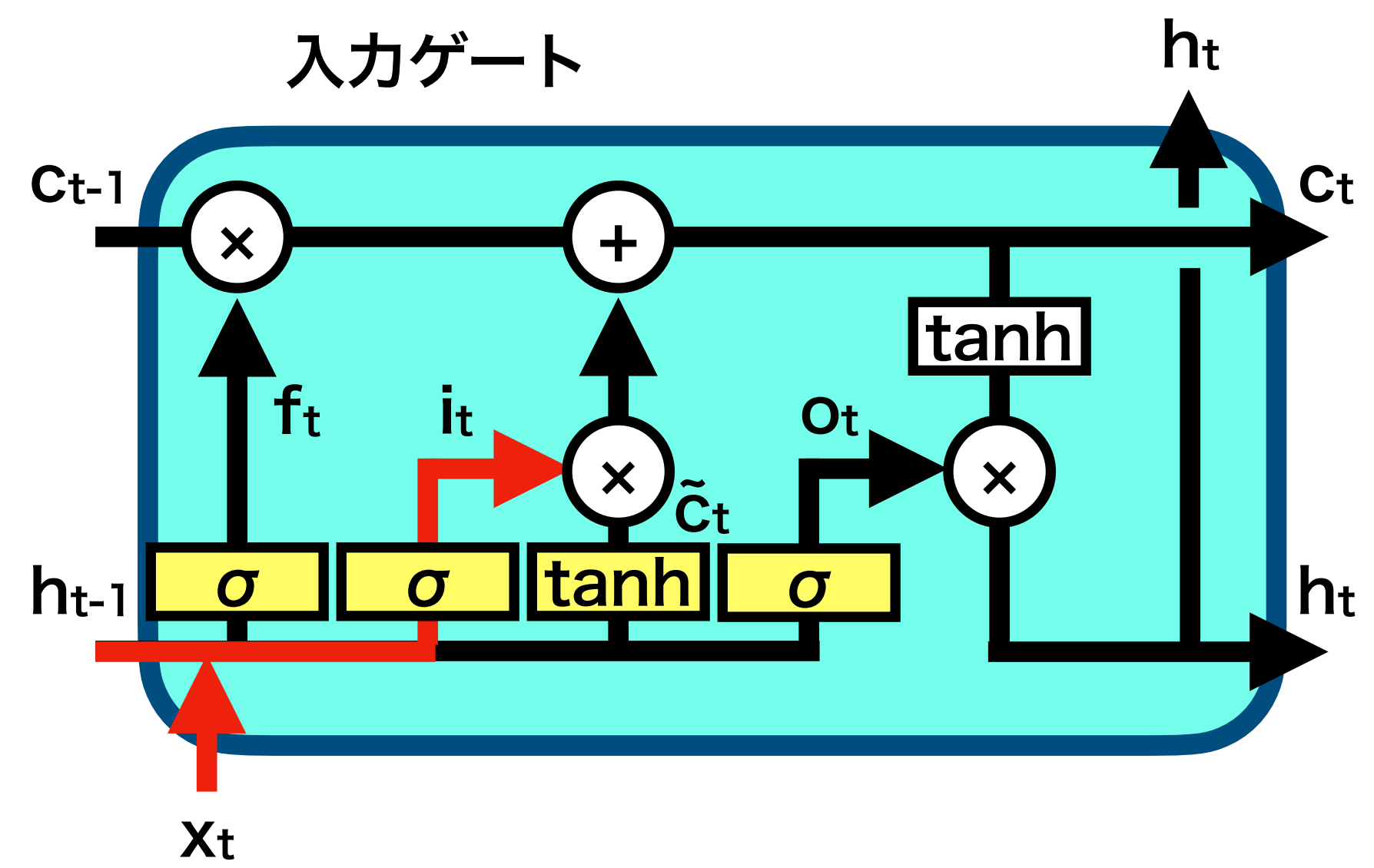
Many to One

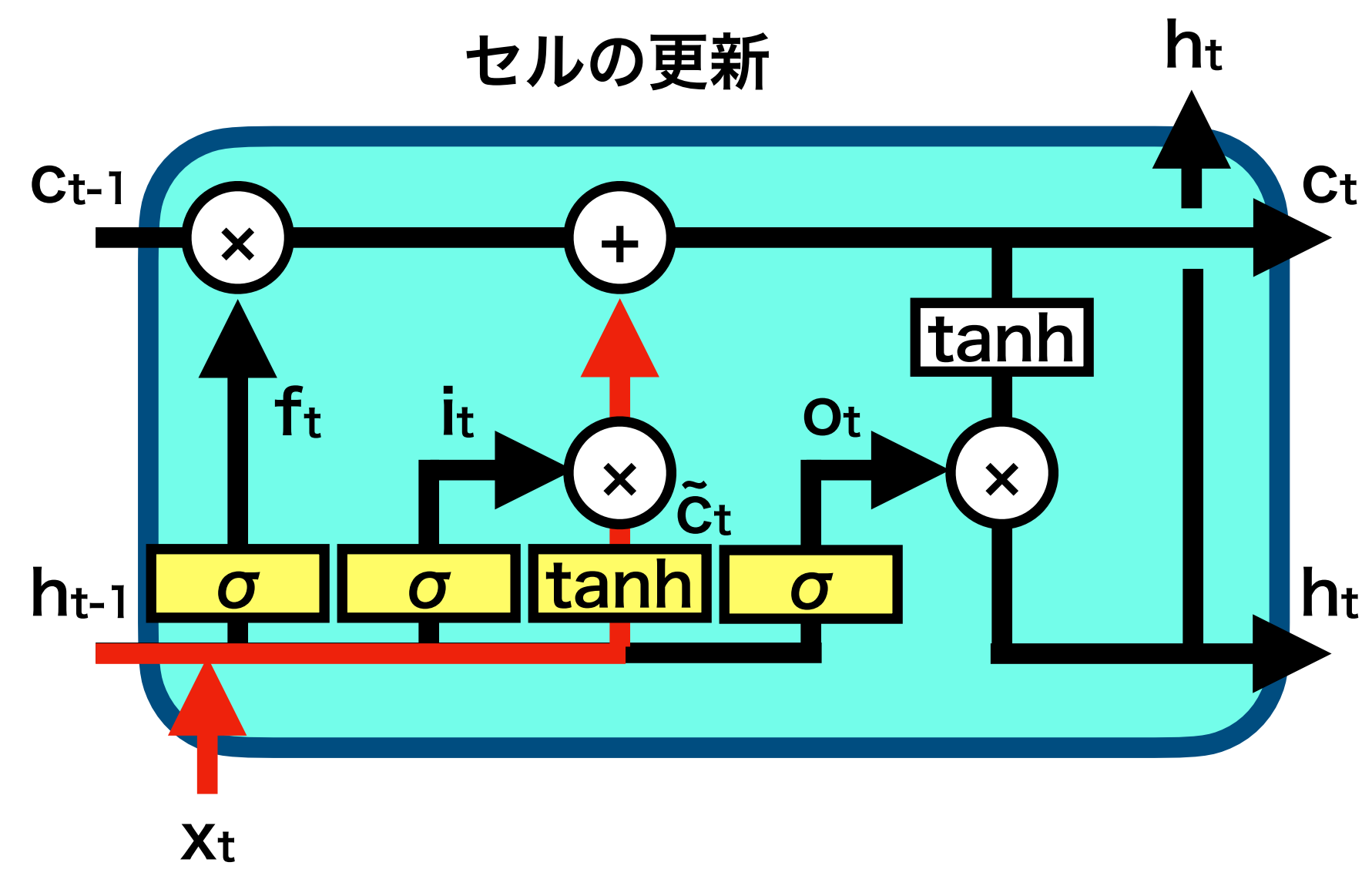


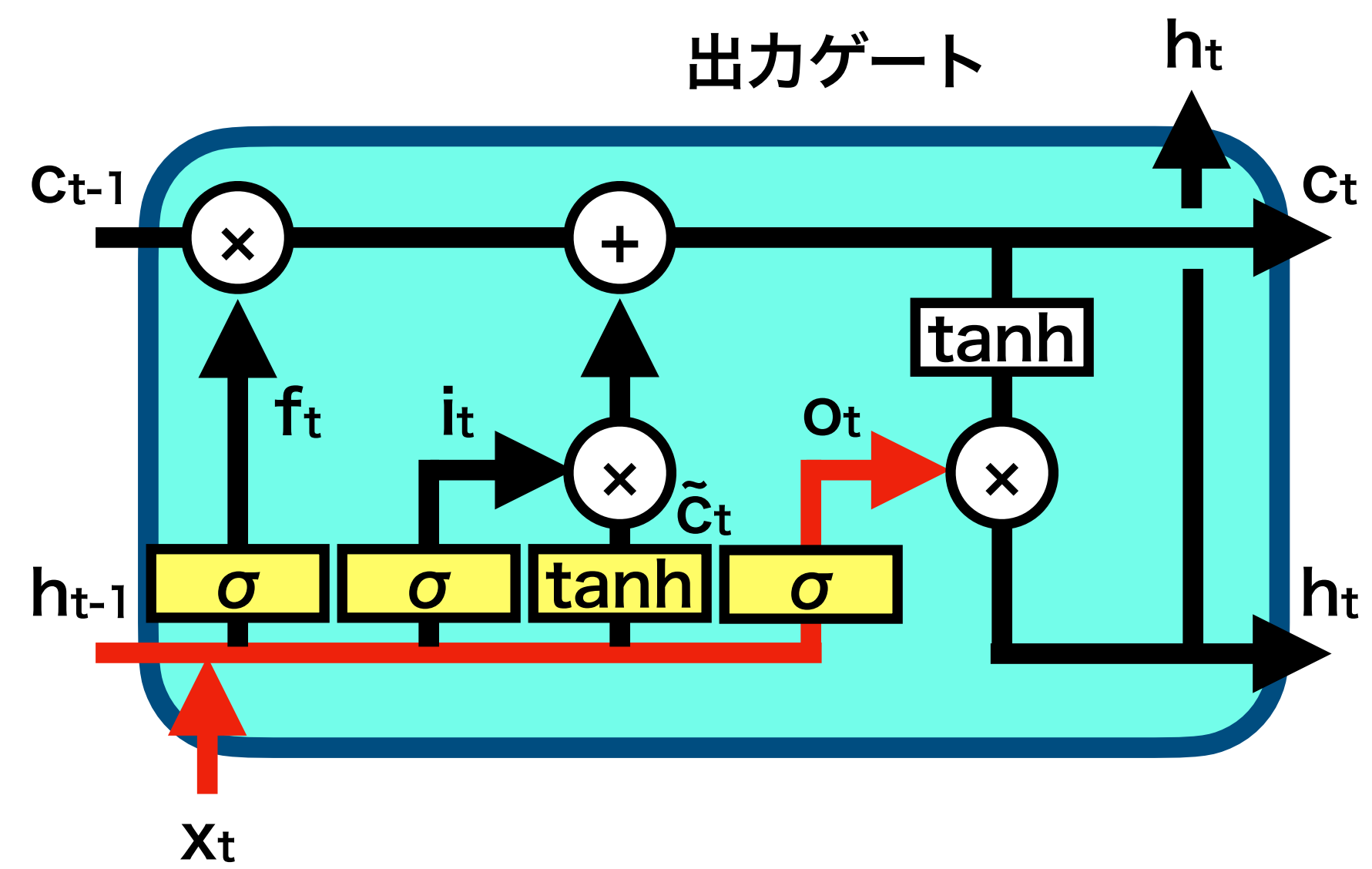


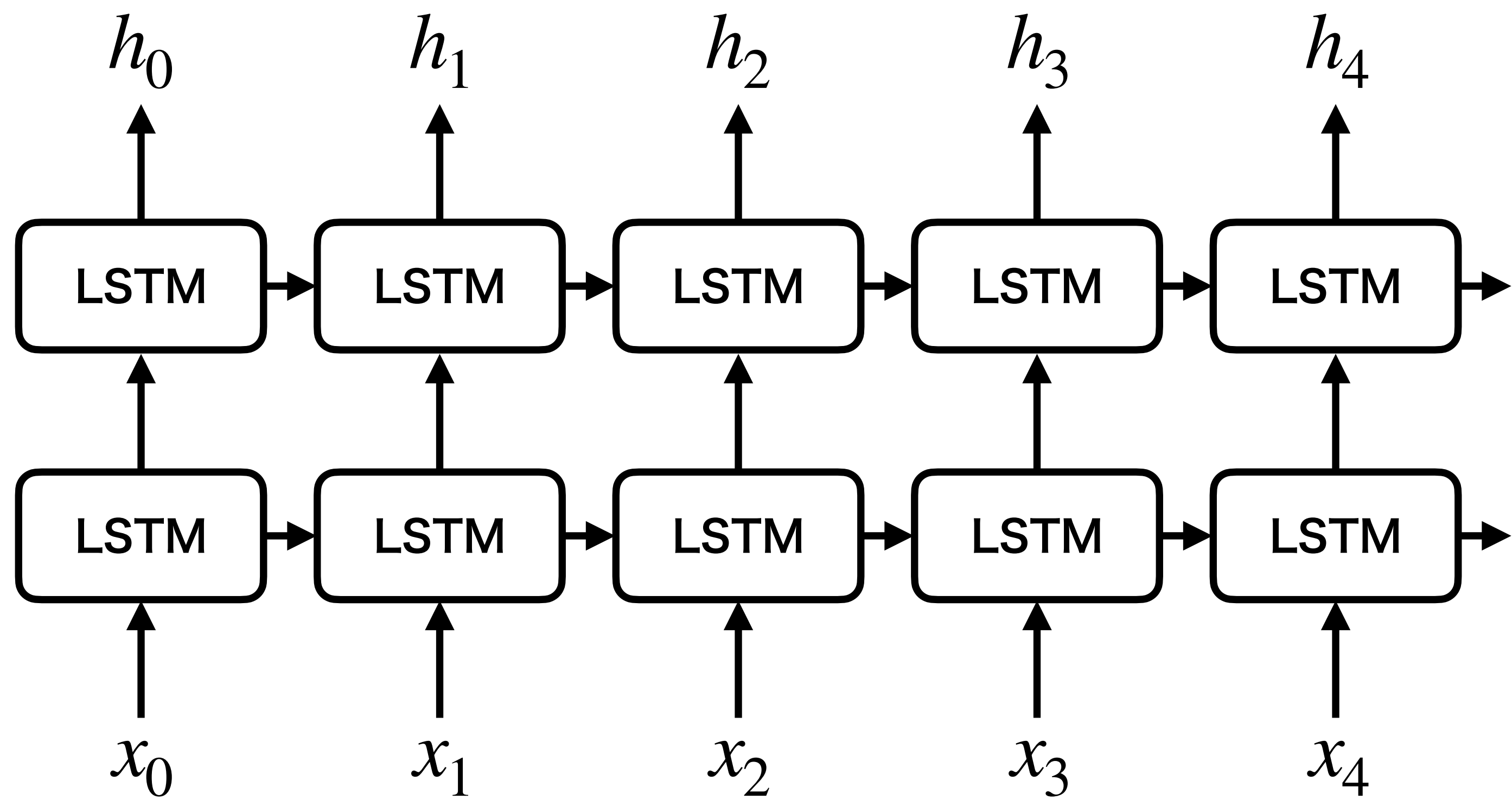


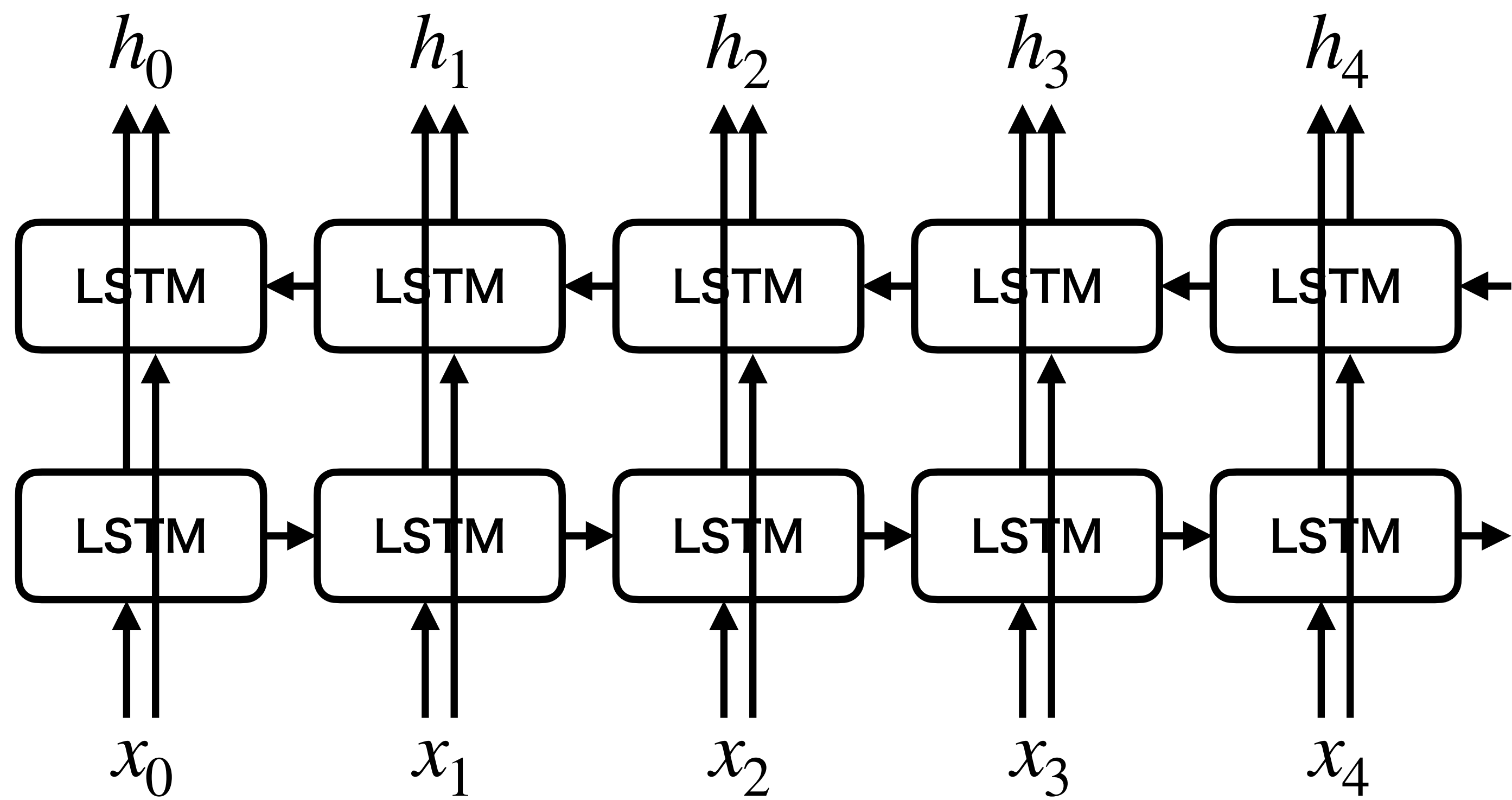


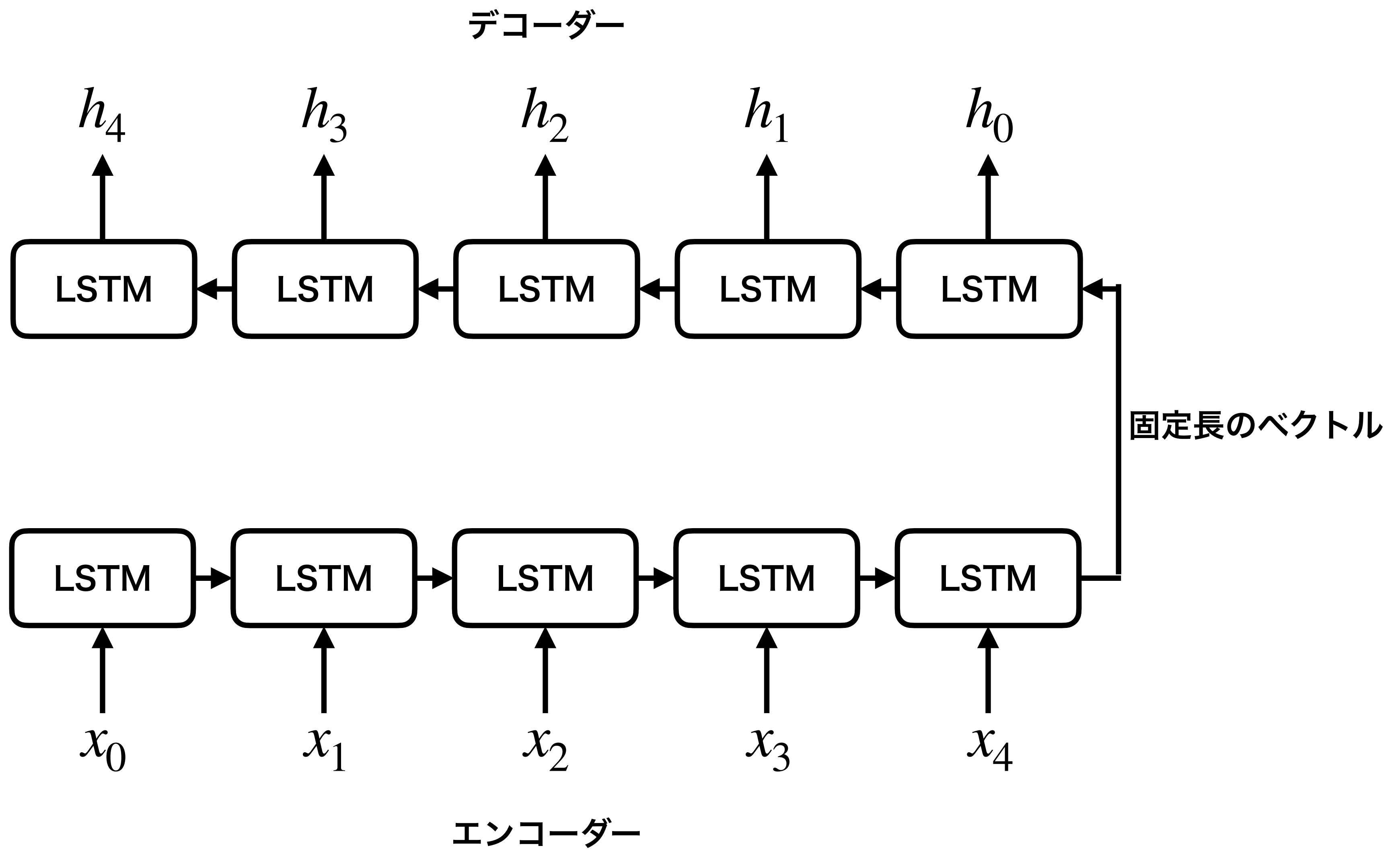


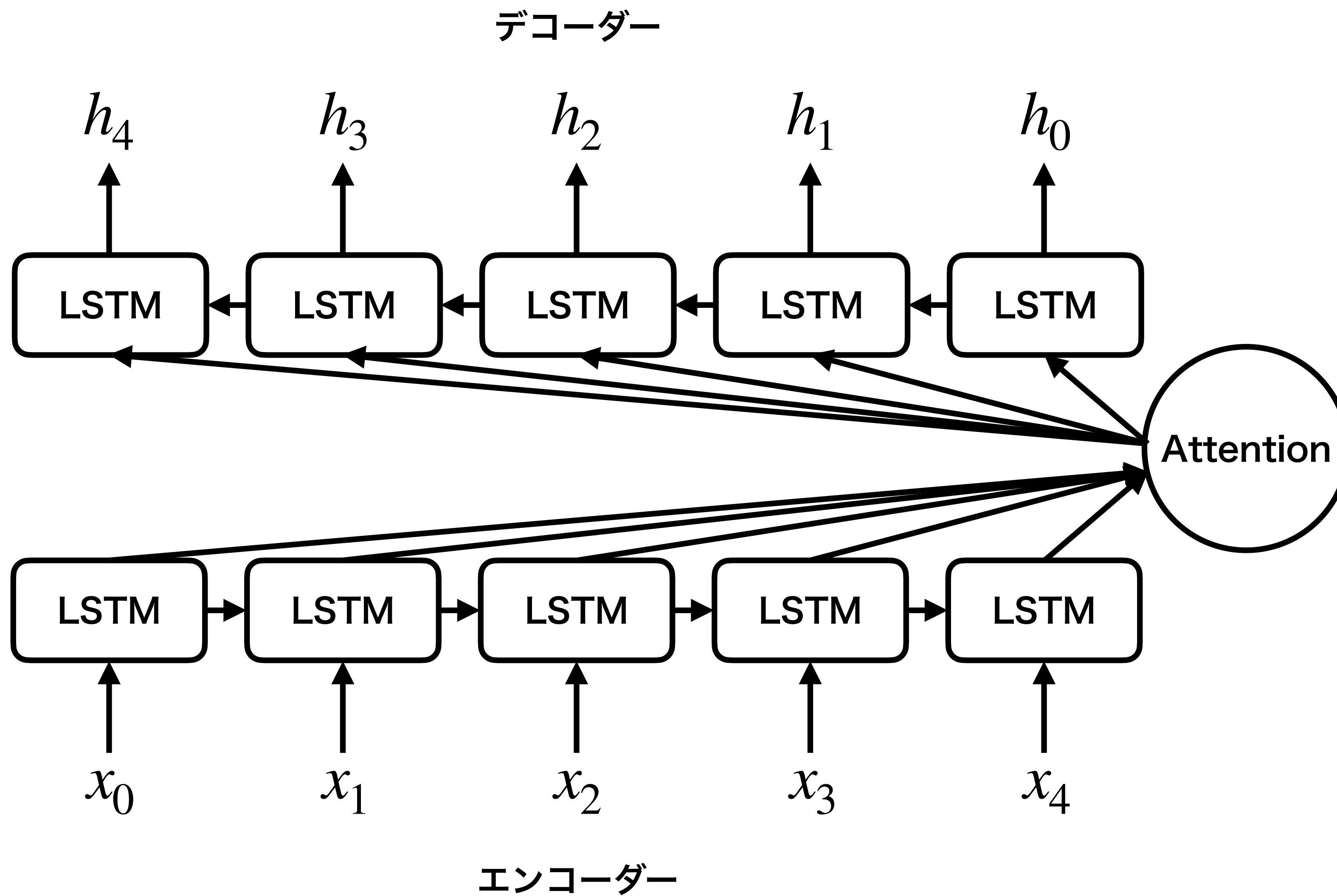


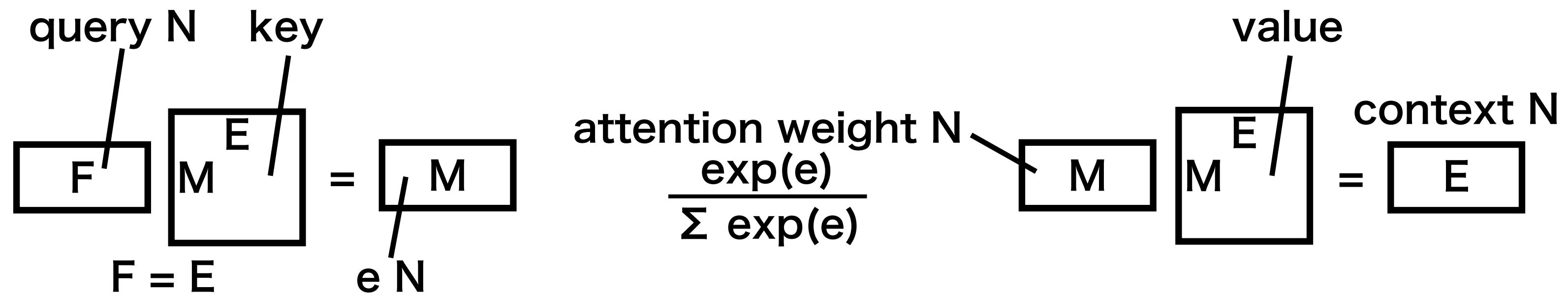
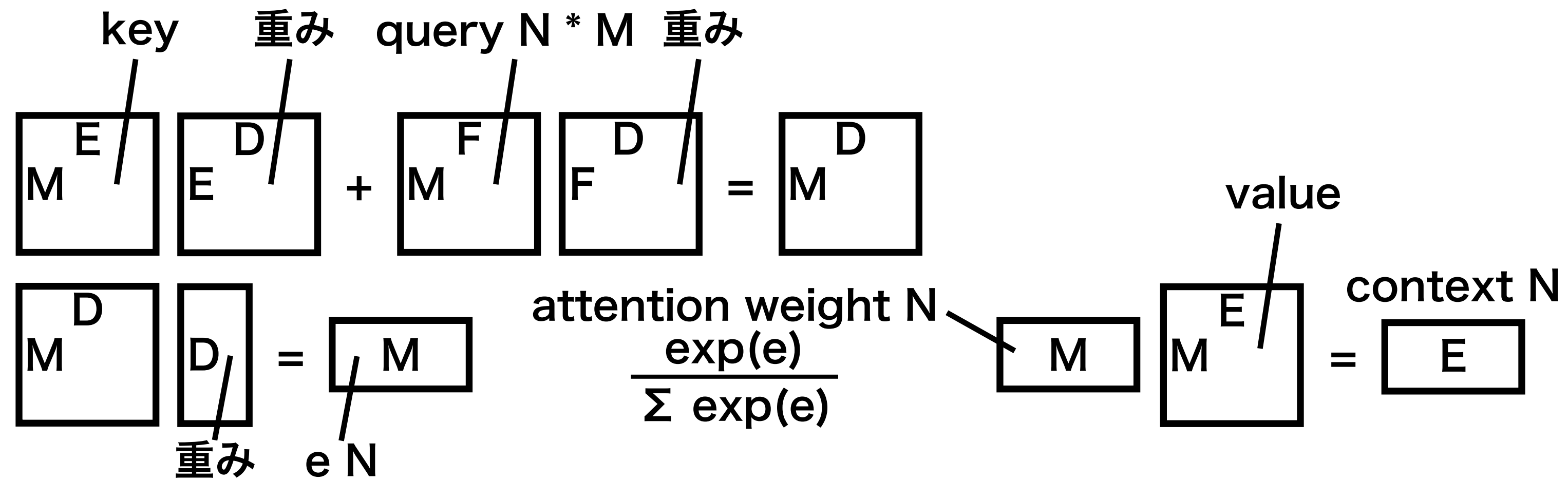


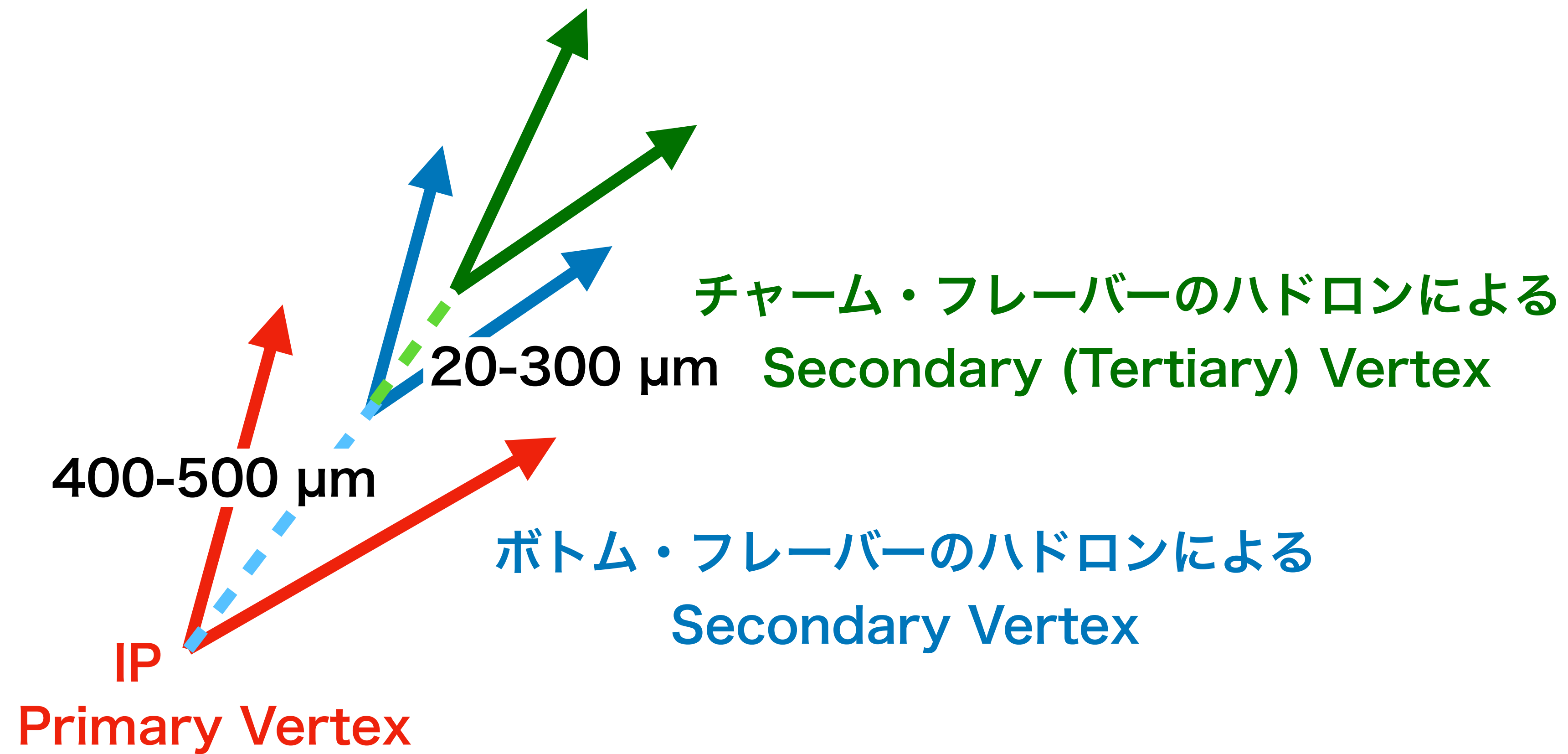












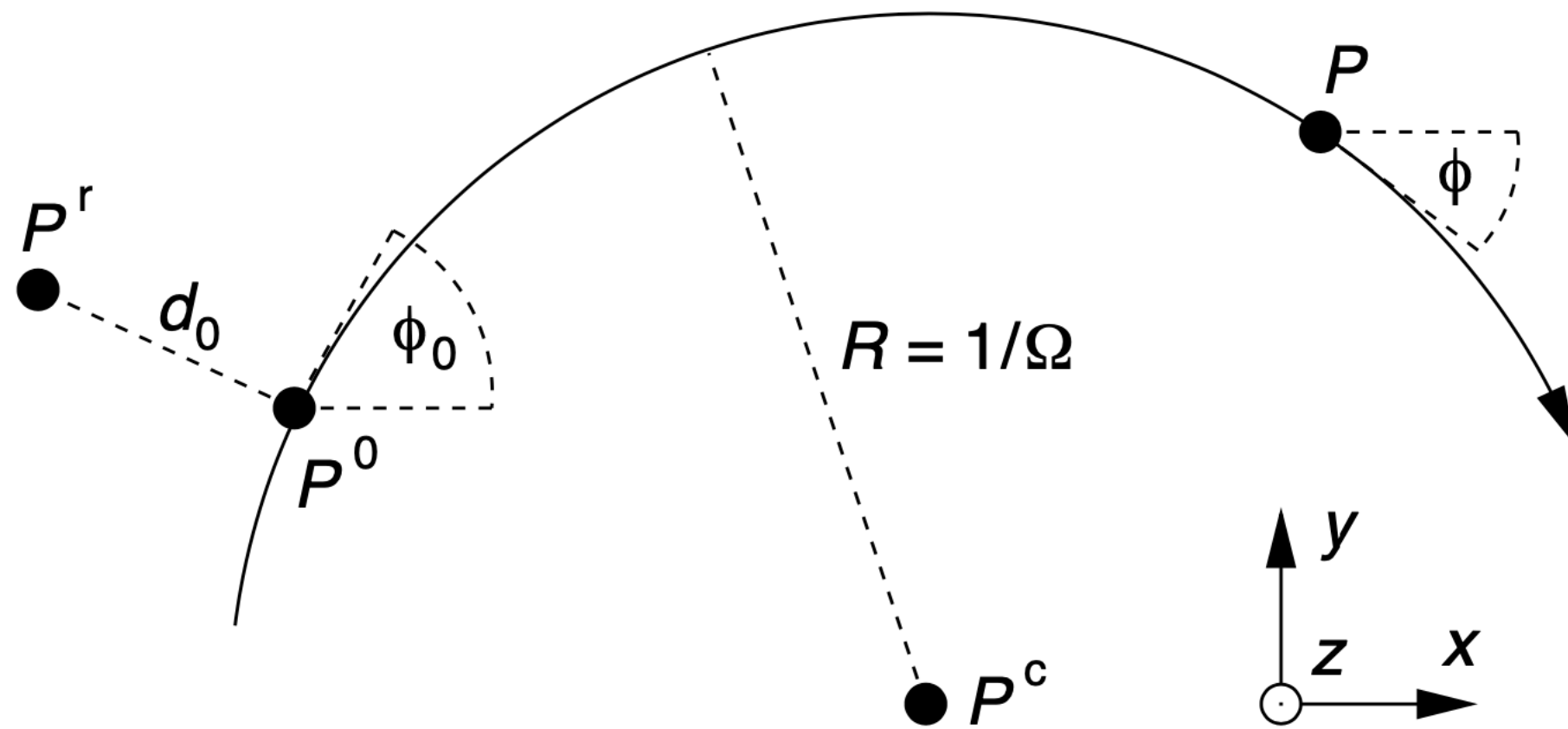


Figure 1: The projection of a helix segment in the xy plane is a part of an arc with centre P^c and radius R . The direction of the particle is shown with the arrow at the arc. All track parameters are given relative to the reference point P^r .

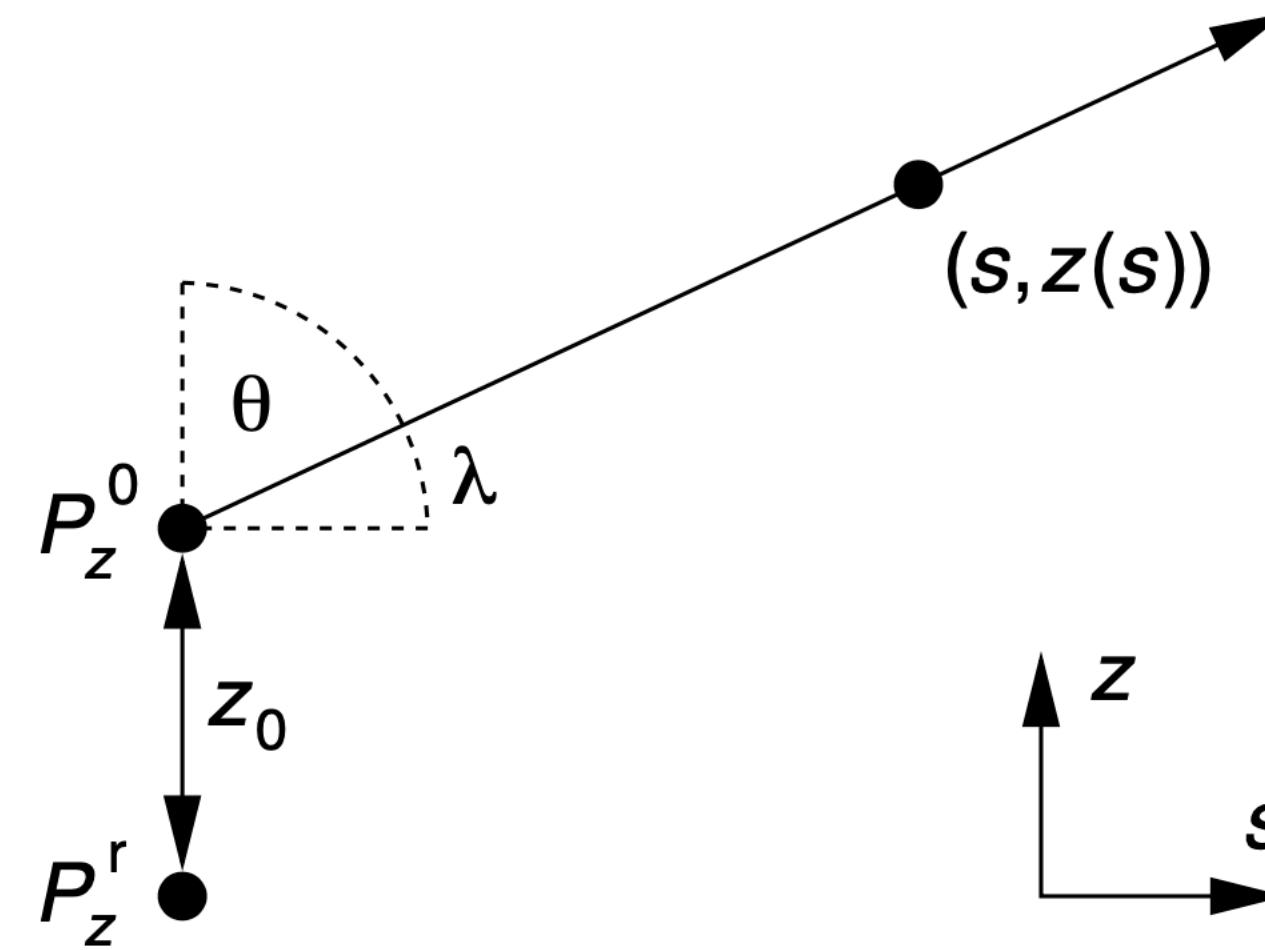
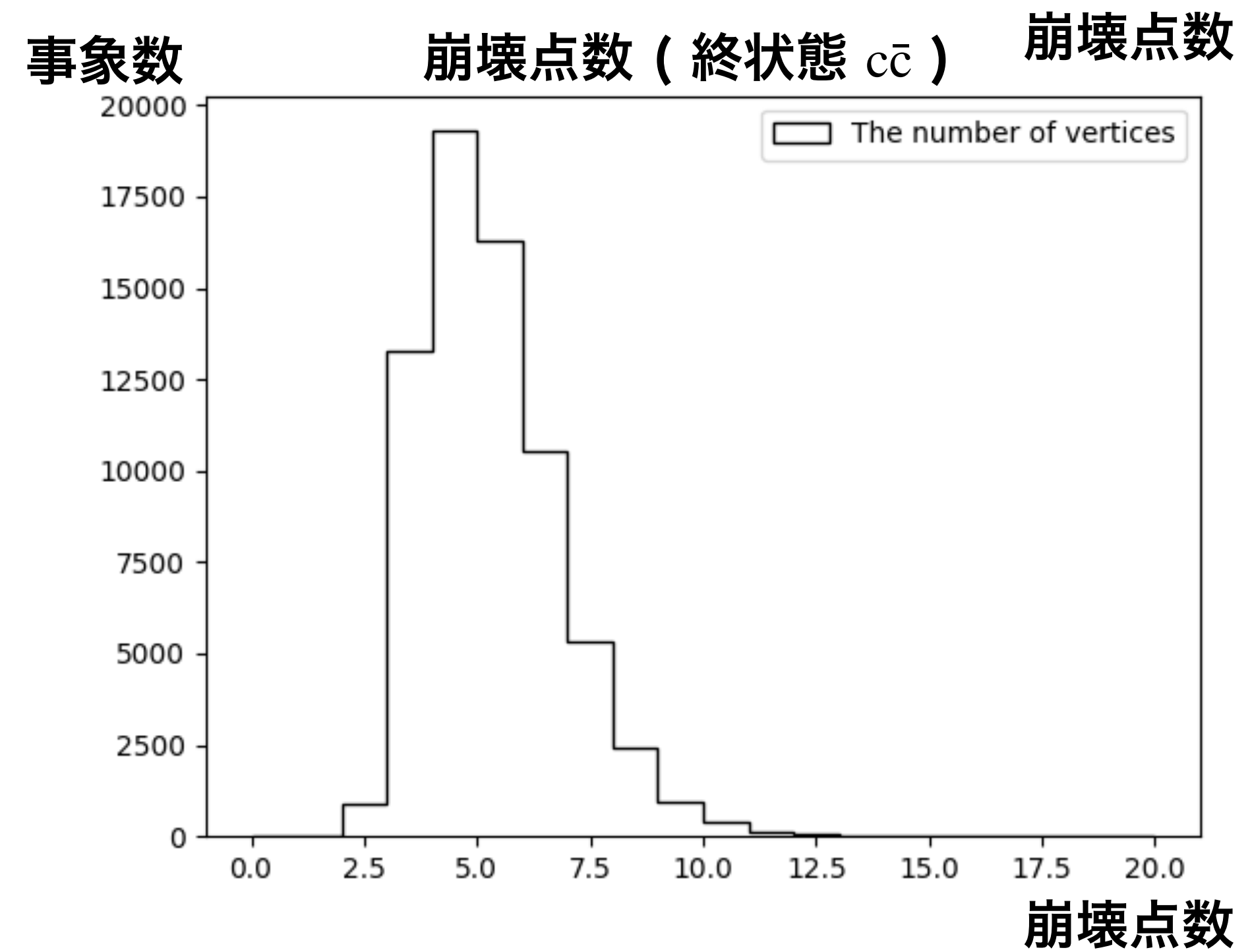
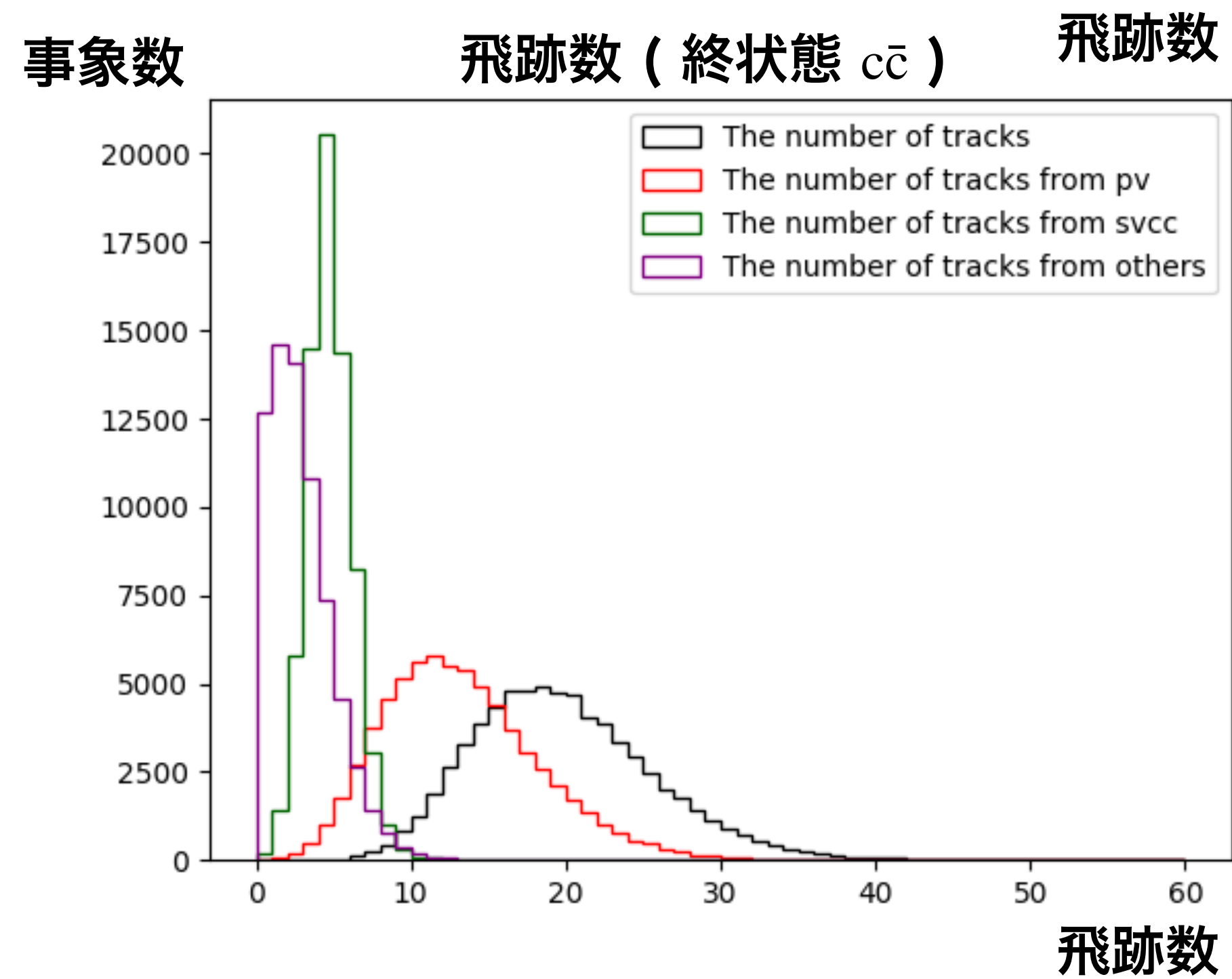
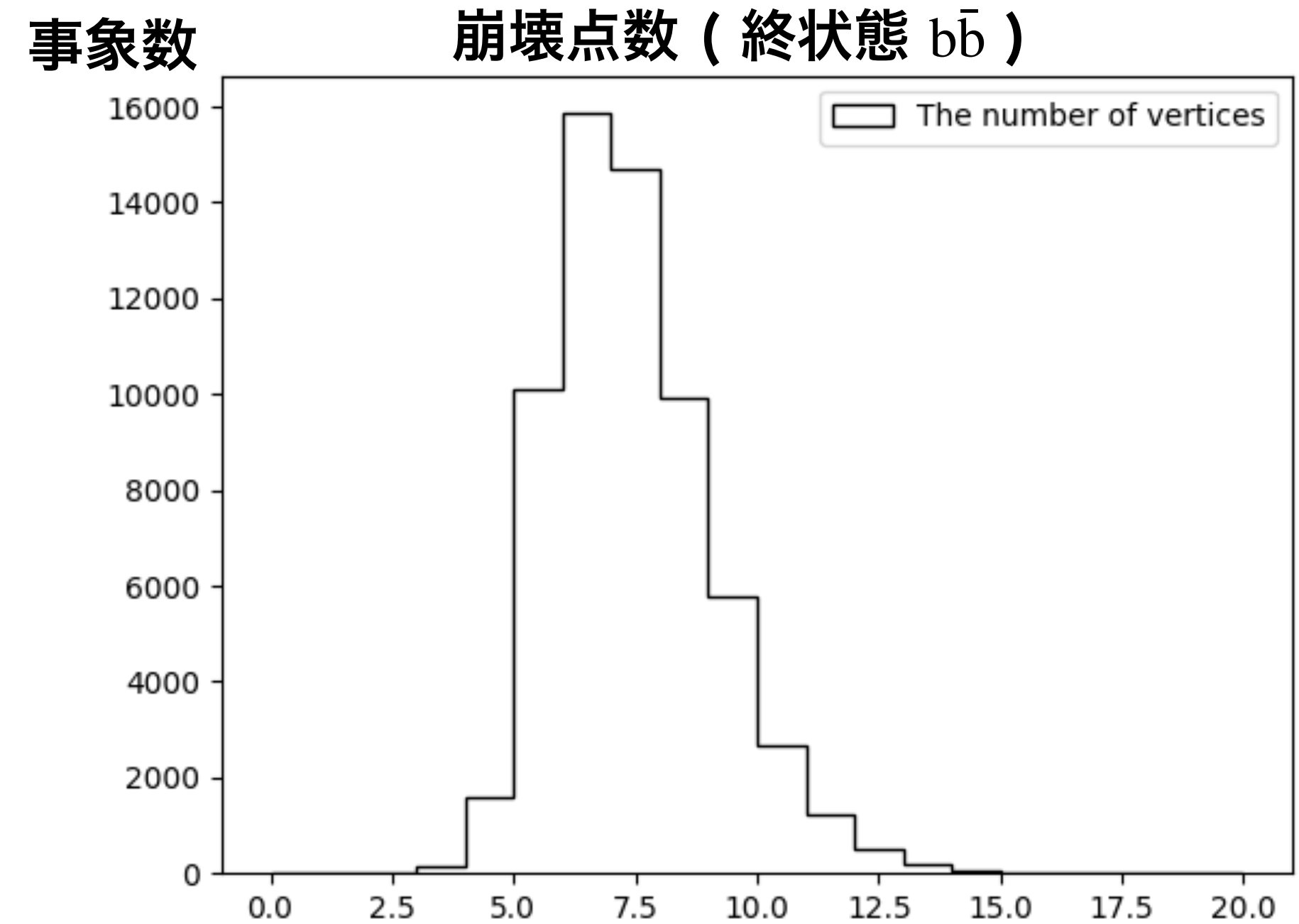
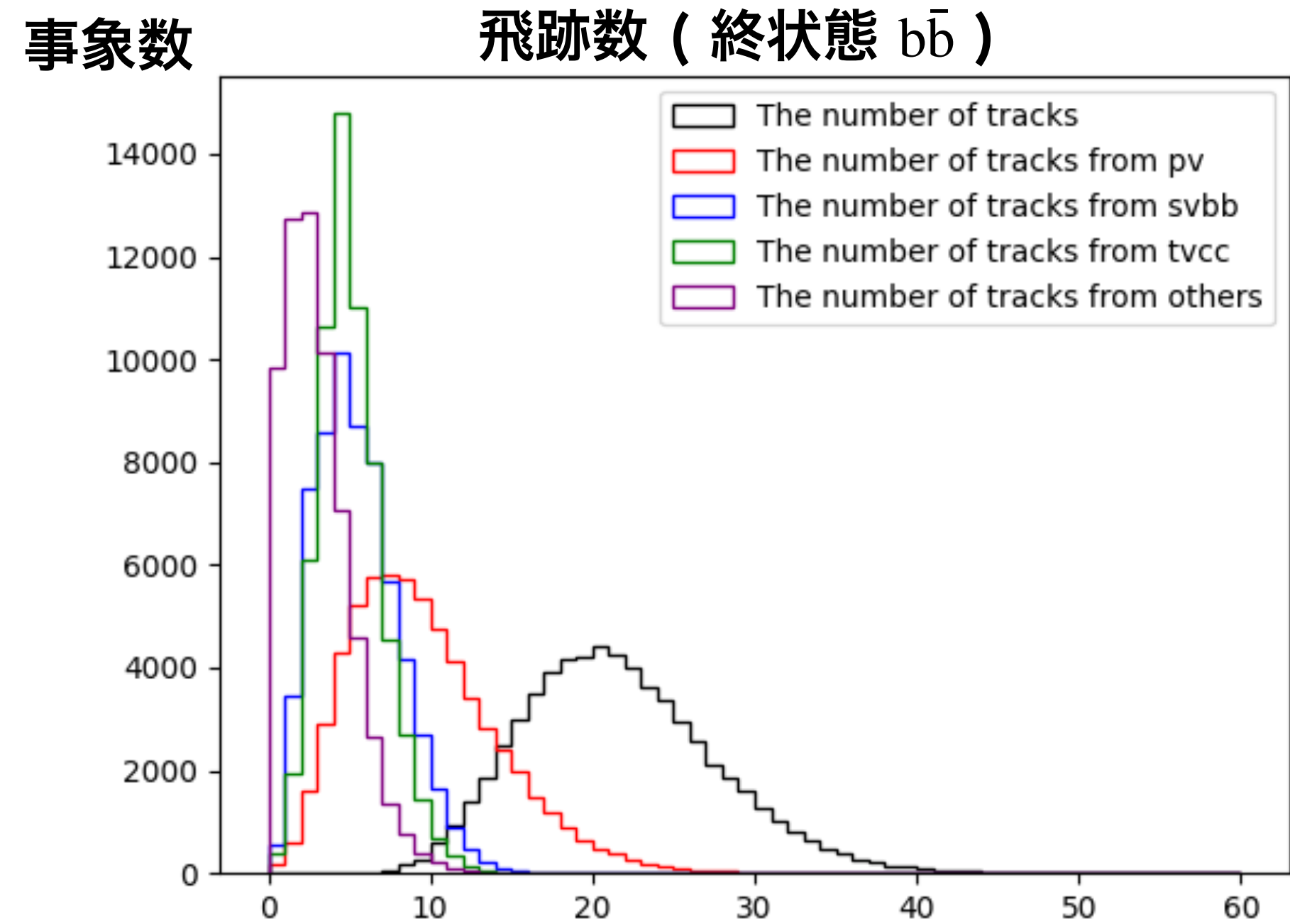
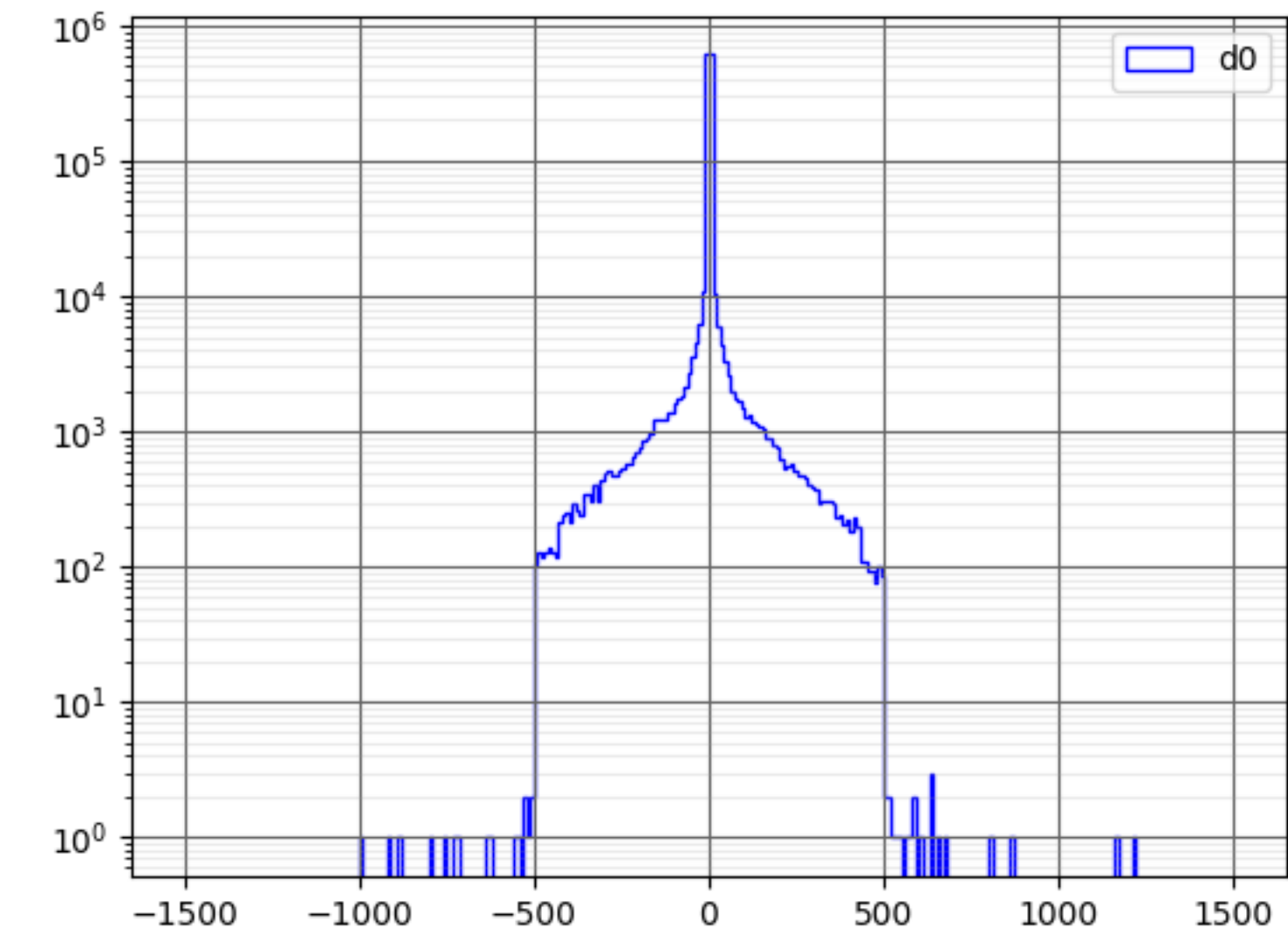


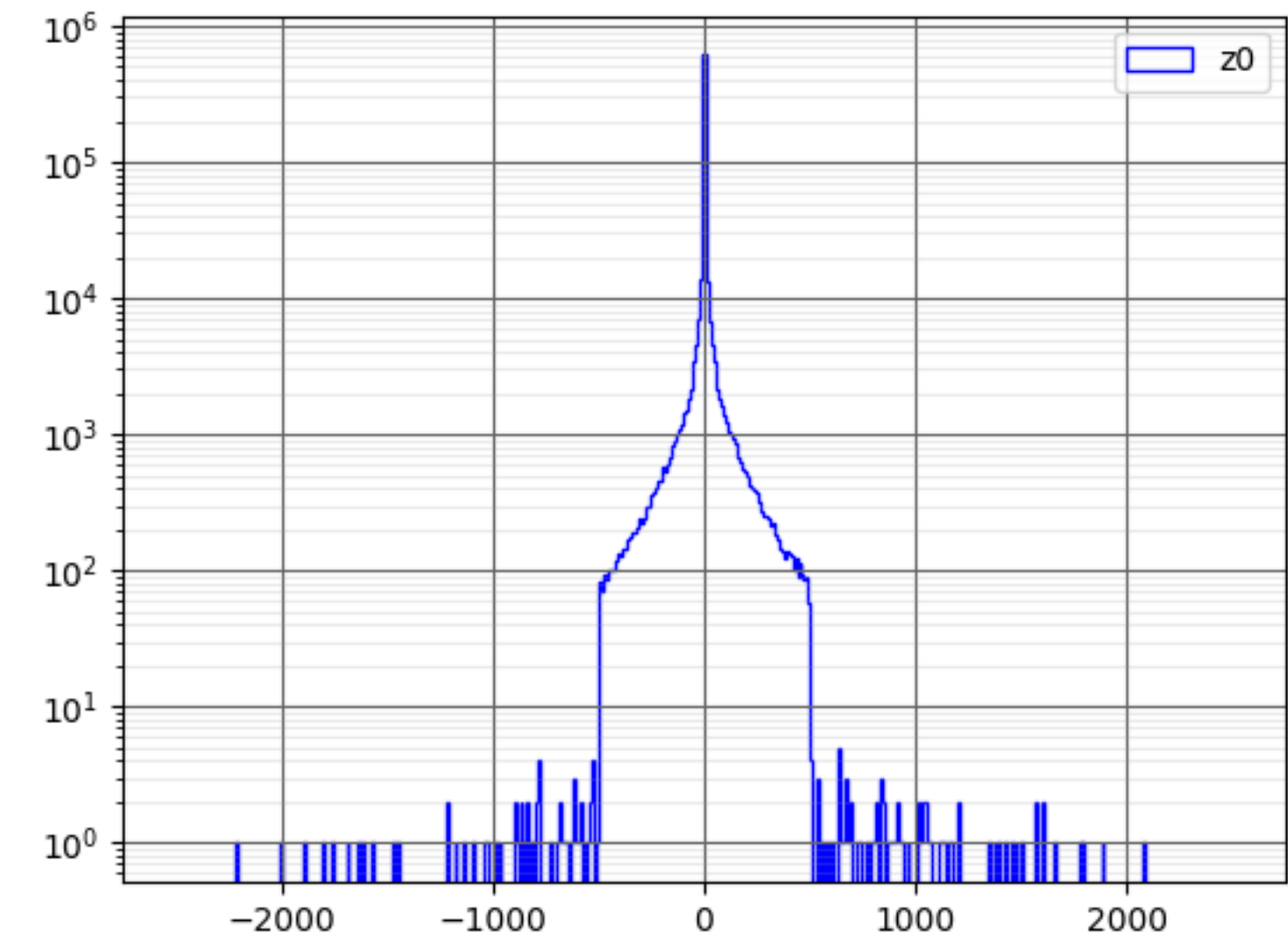
Figure 2: The projection of a helix in the sz plane is a straight line (see Eq. 10). The variable s at a point P is the arc length in the xy plane from P^0 to P . This also implies that $s = 0$, if $z = z_0$.



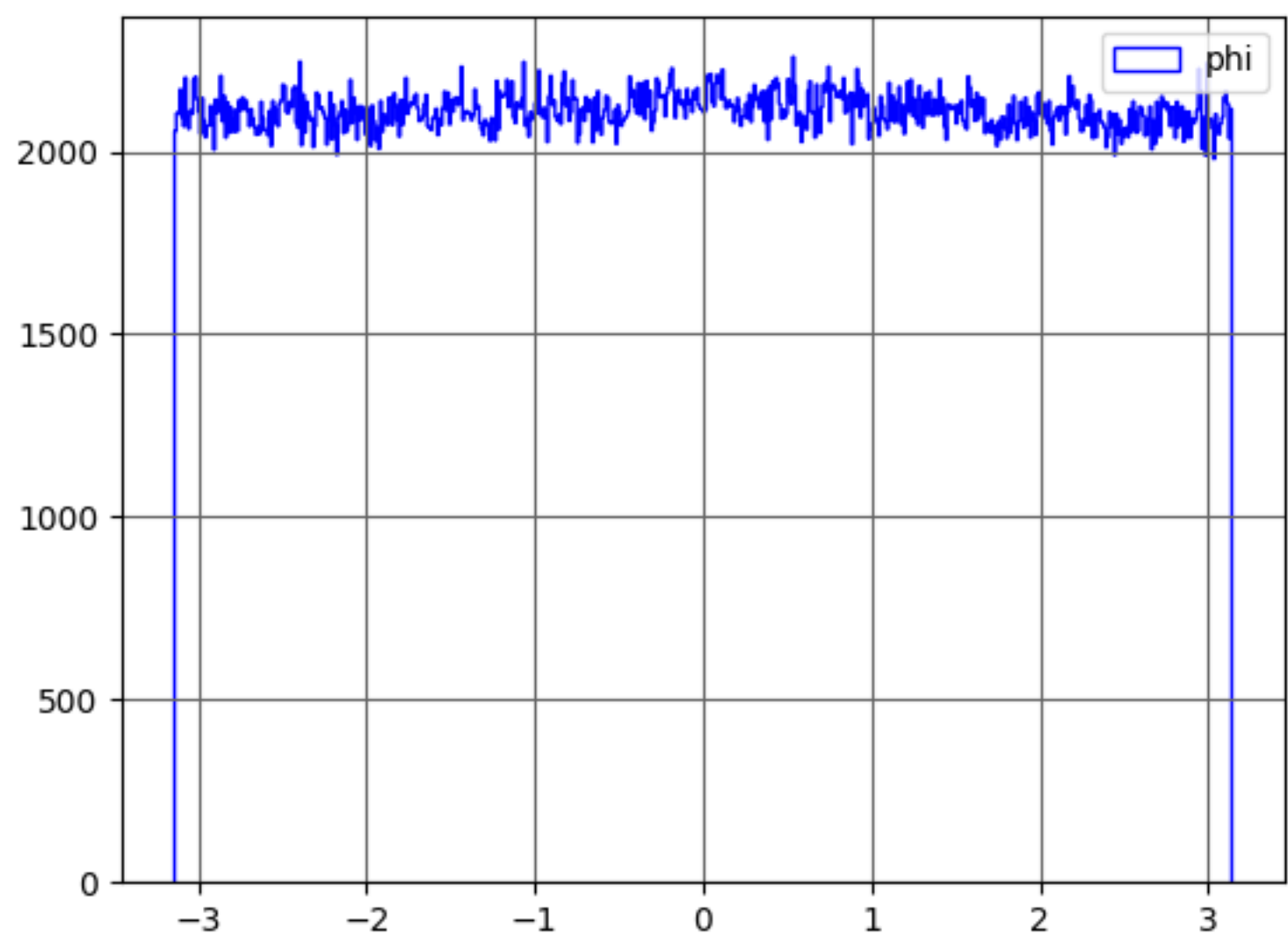
終状態 $b\bar{b}$



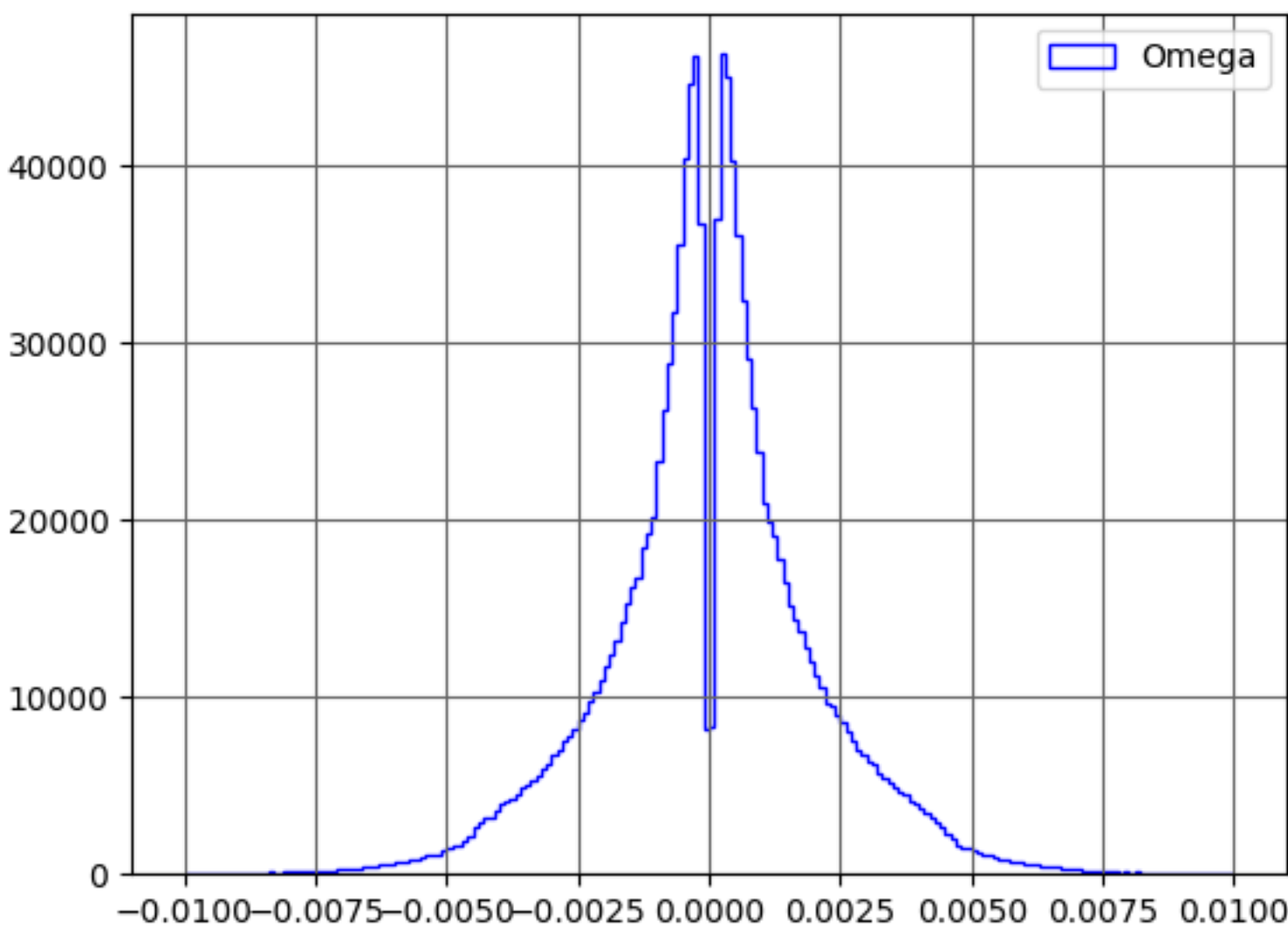
d_0



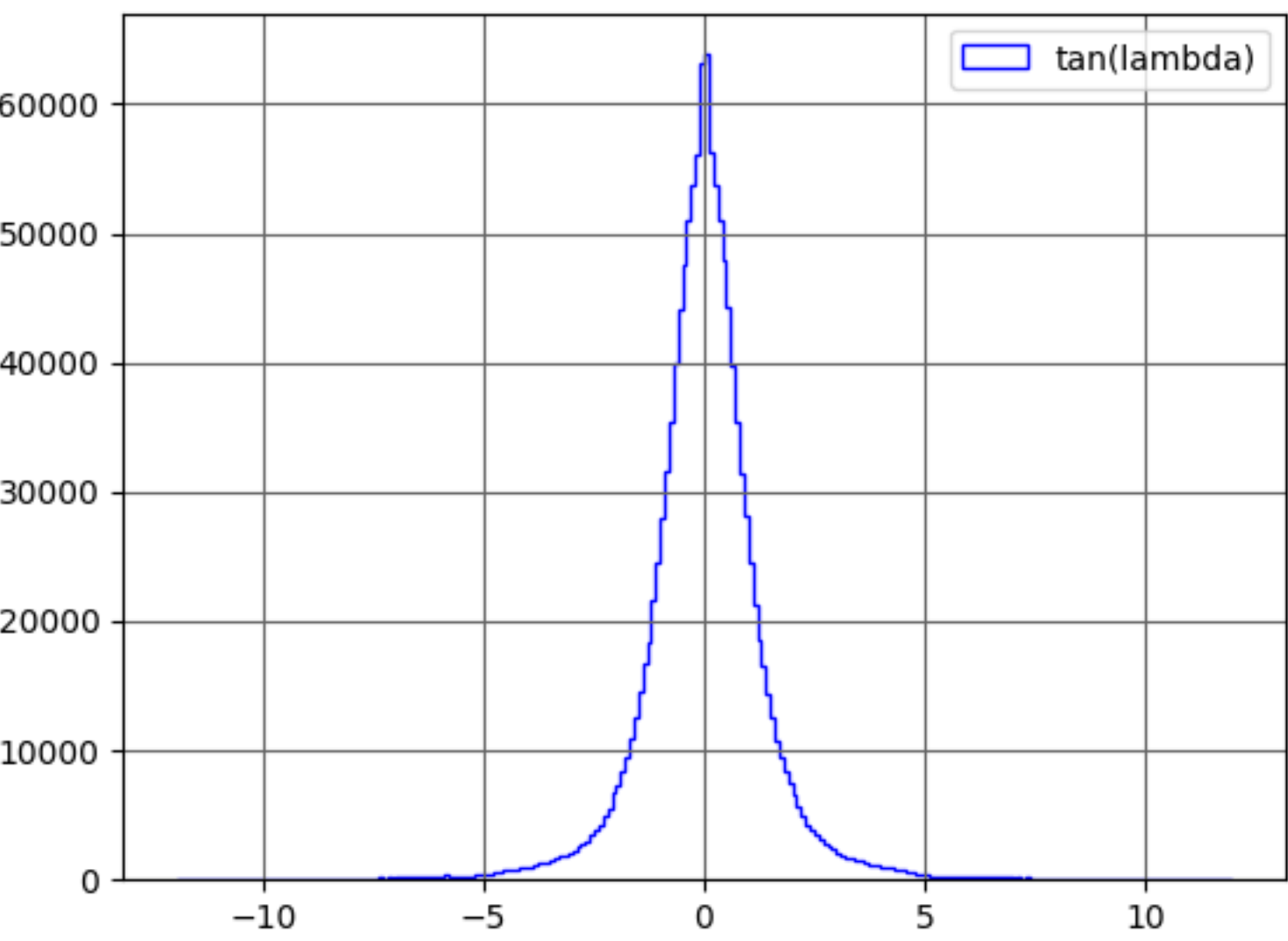
z_0



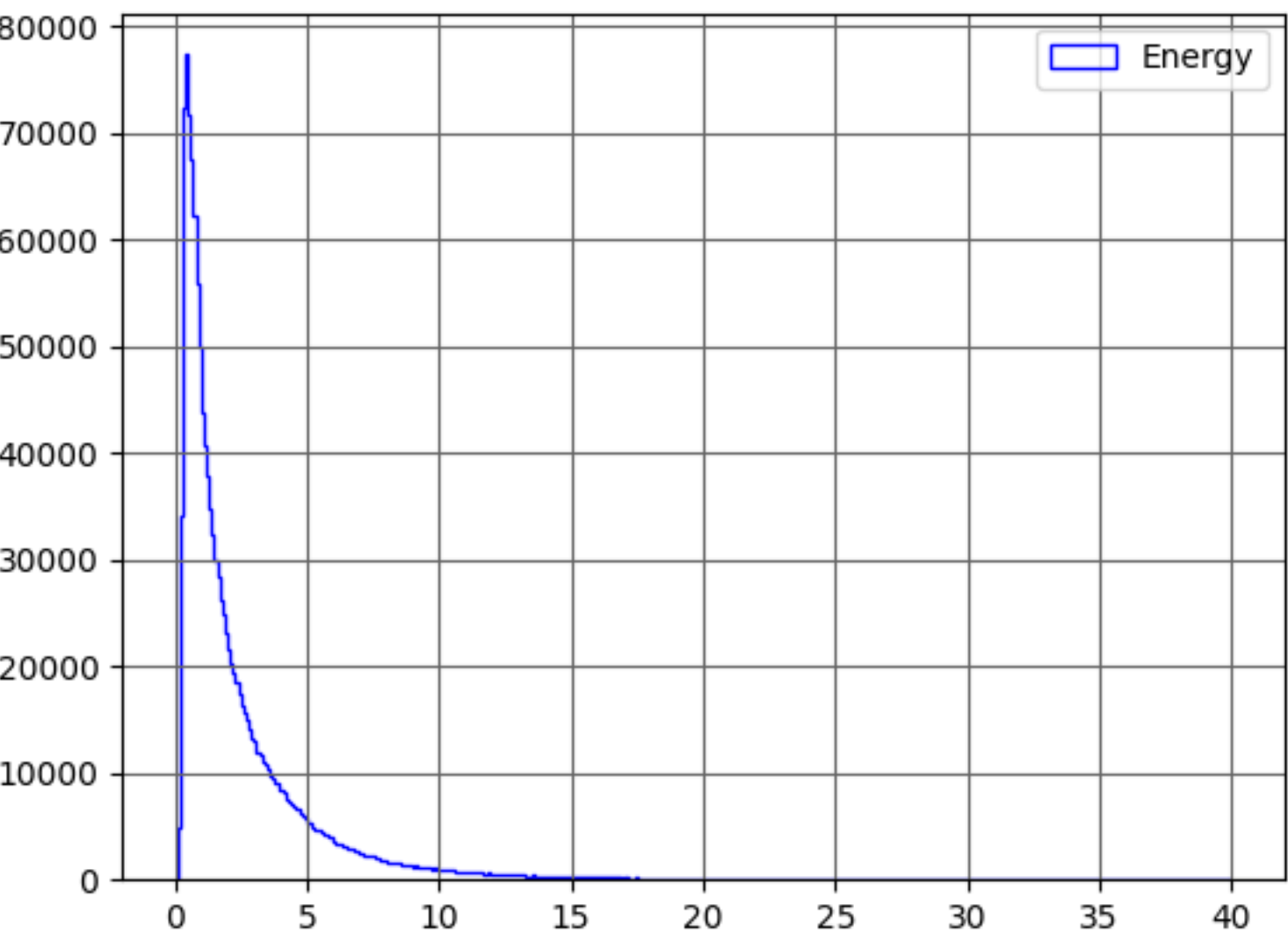
ϕ



Ω

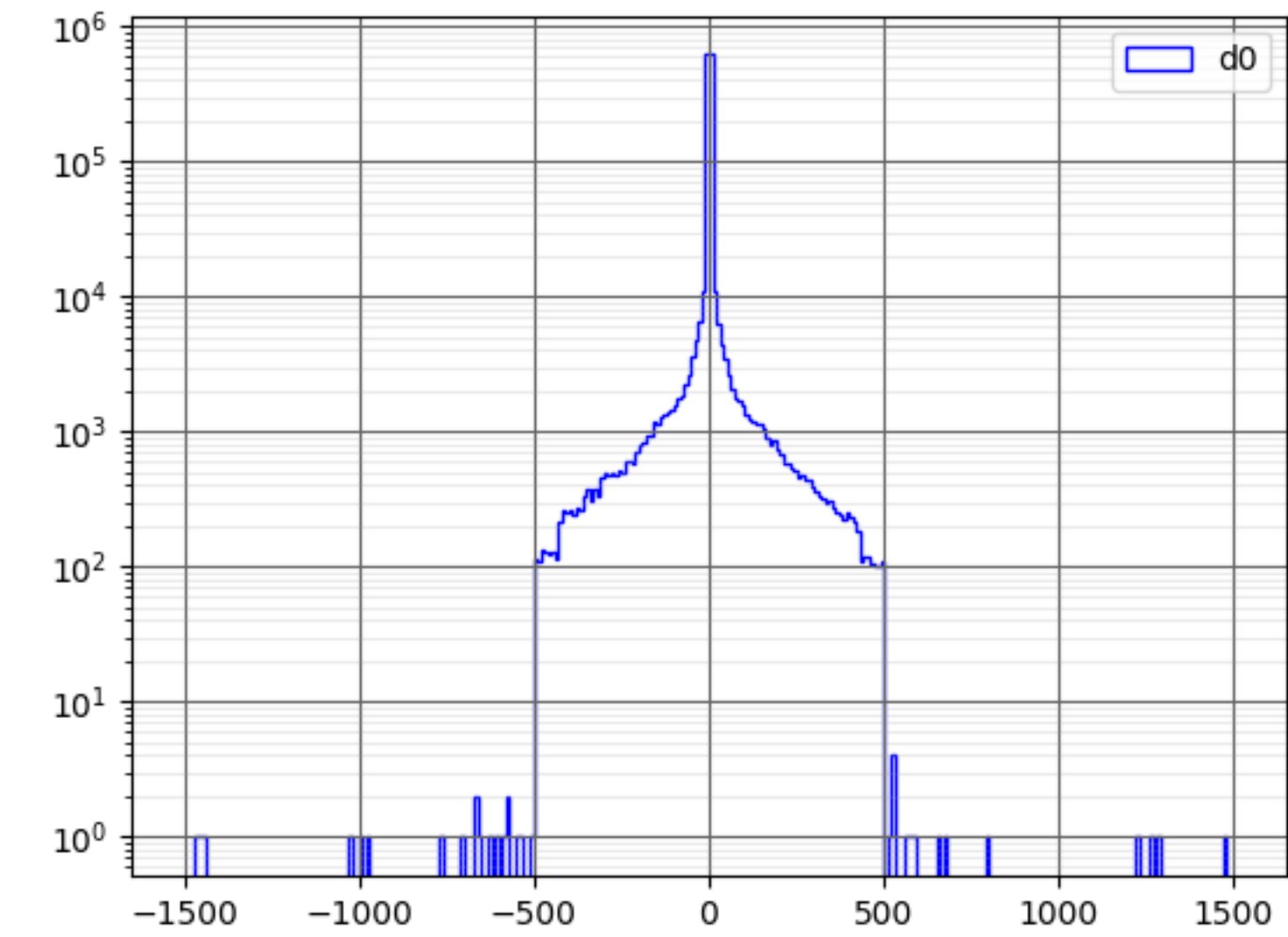


$\tan(\lambda)$

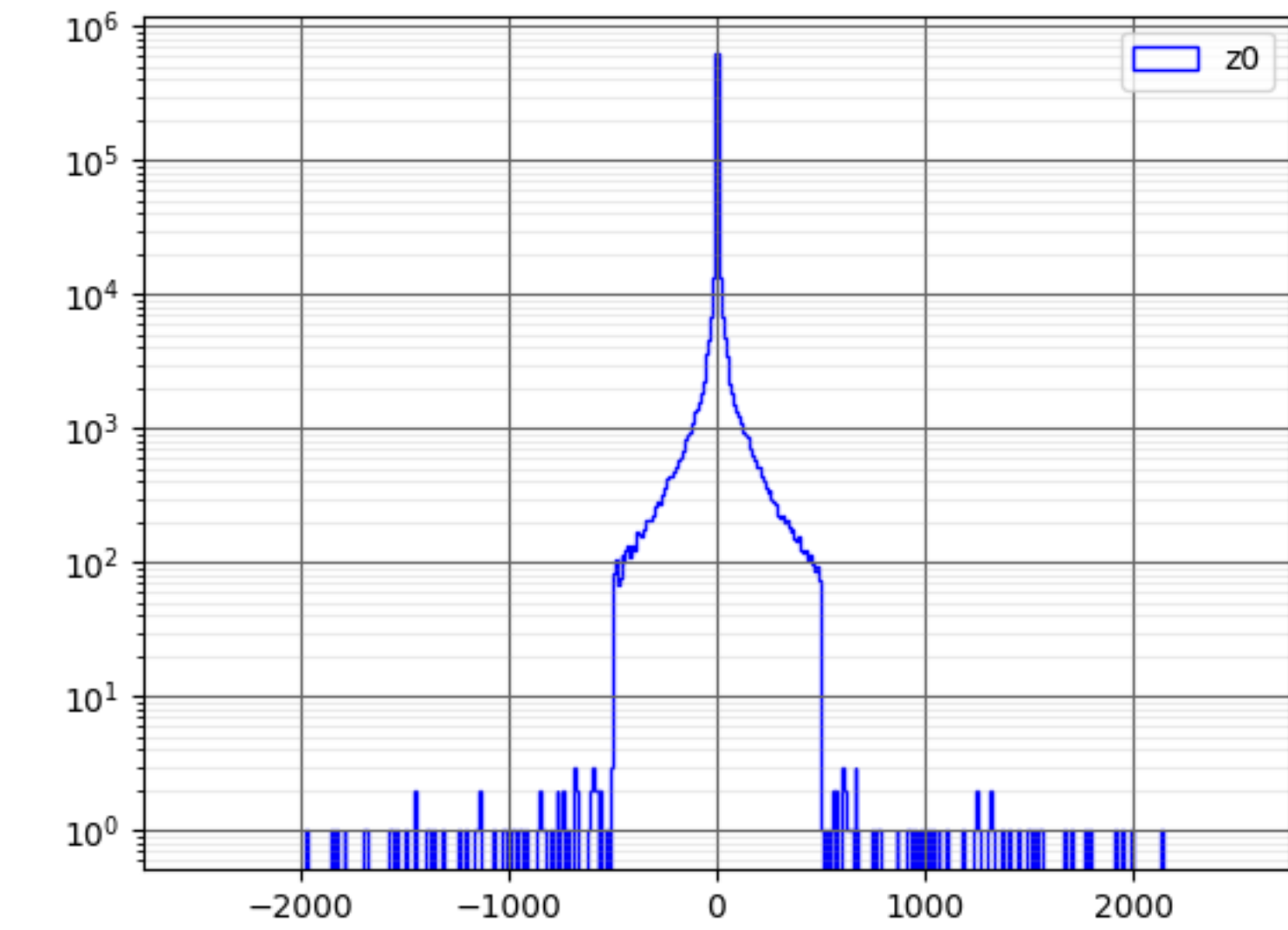


Energy

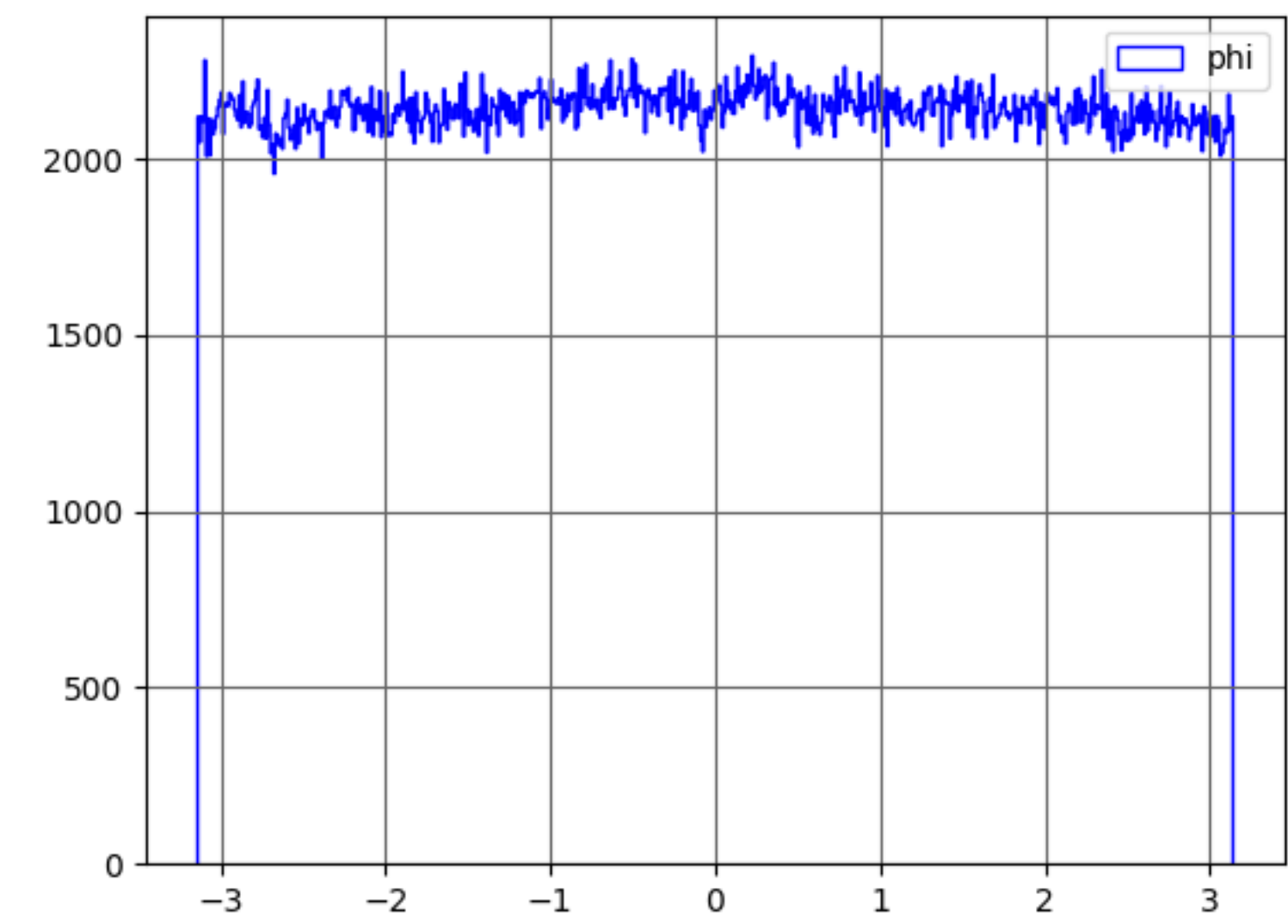
終状態 $c\bar{c}$



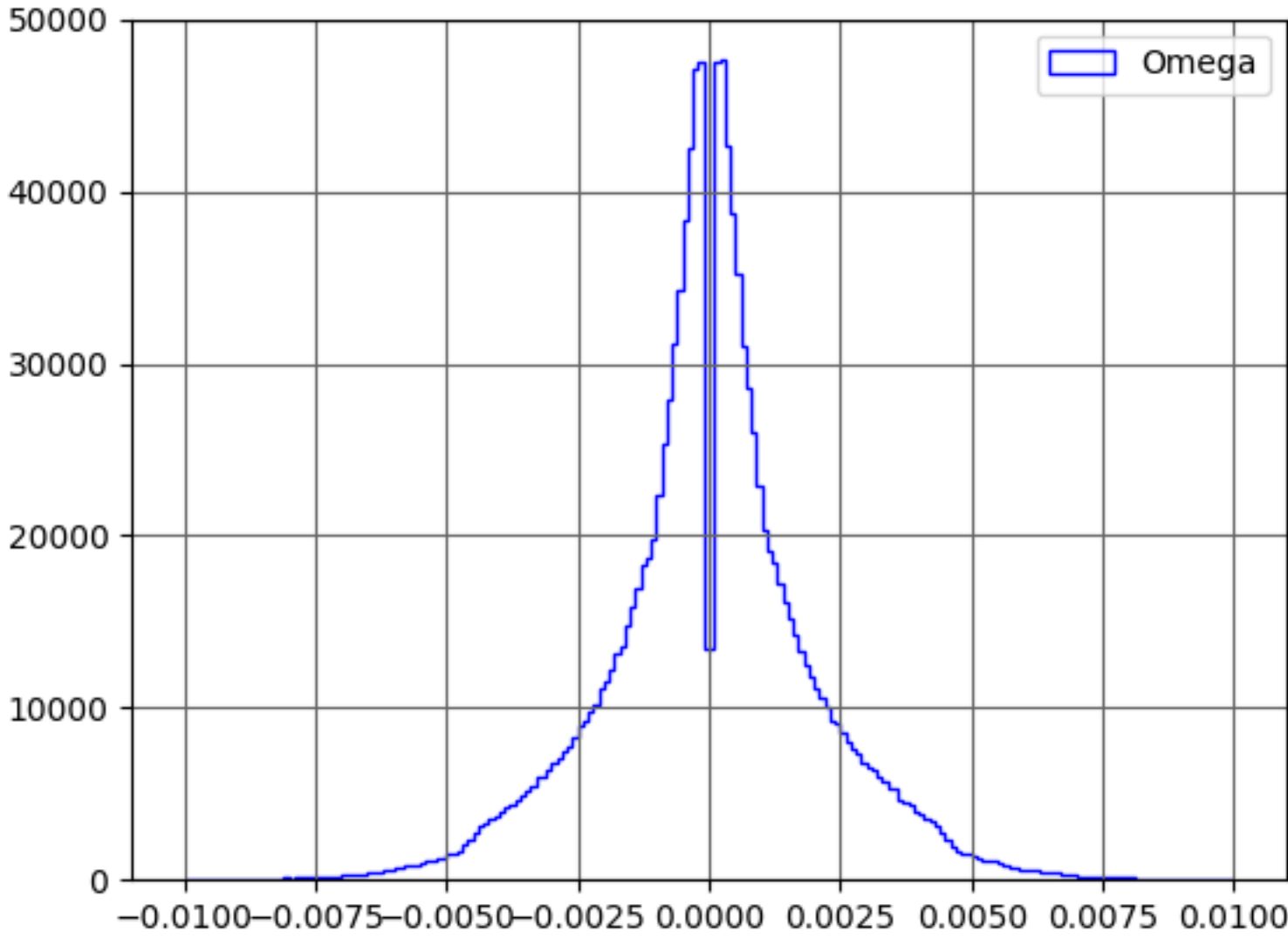
d_0



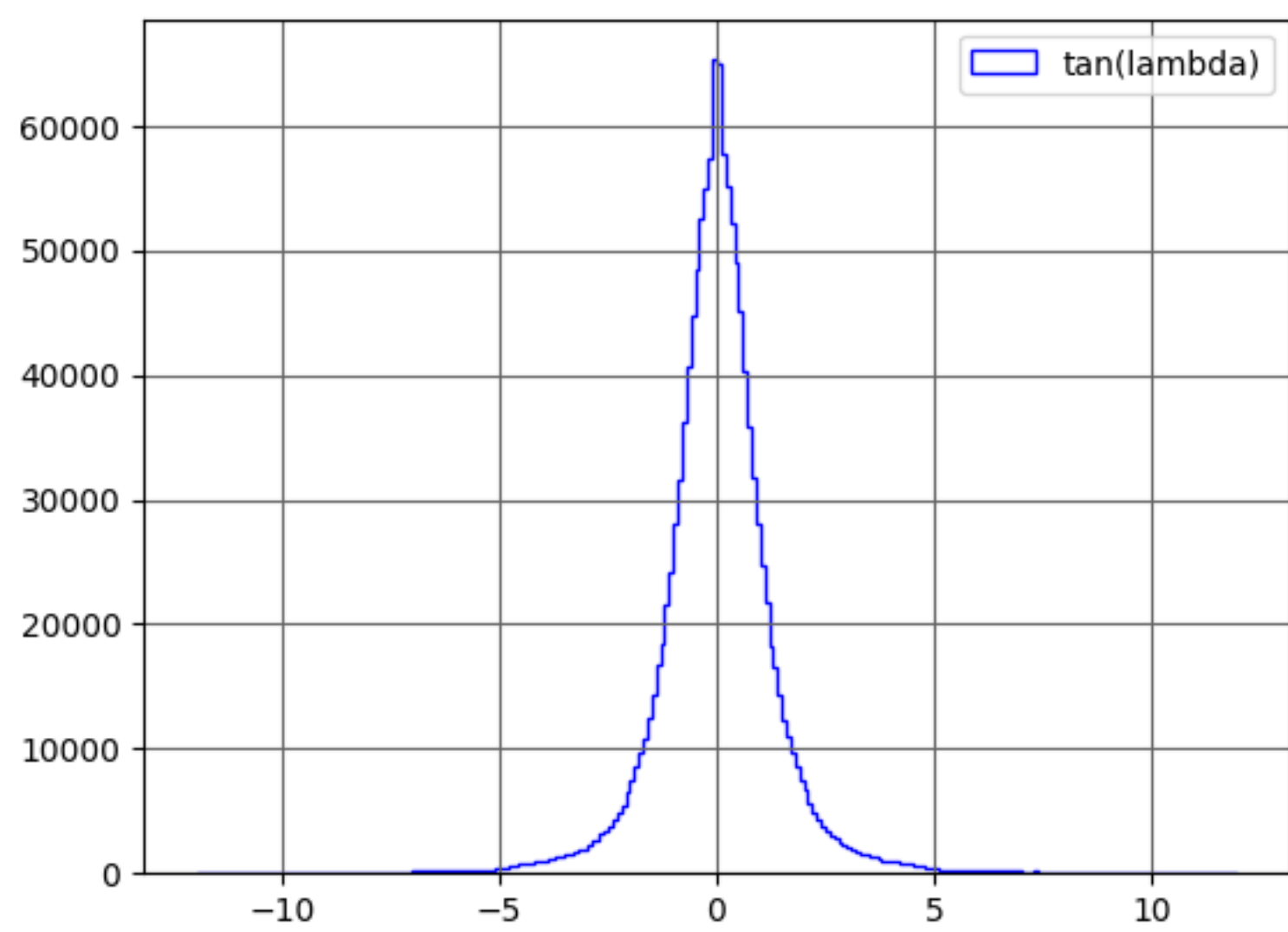
z_0



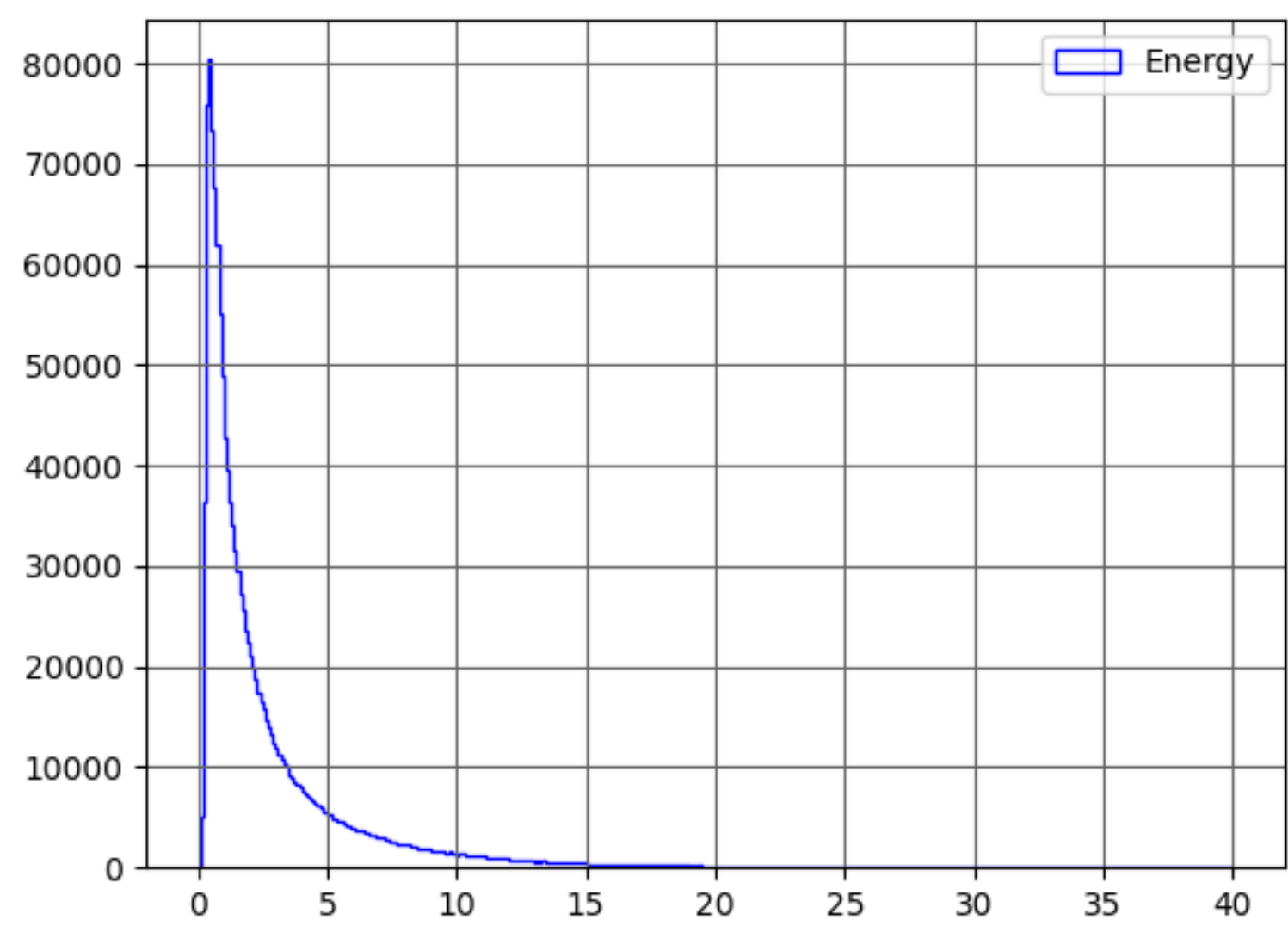
ϕ



Ω

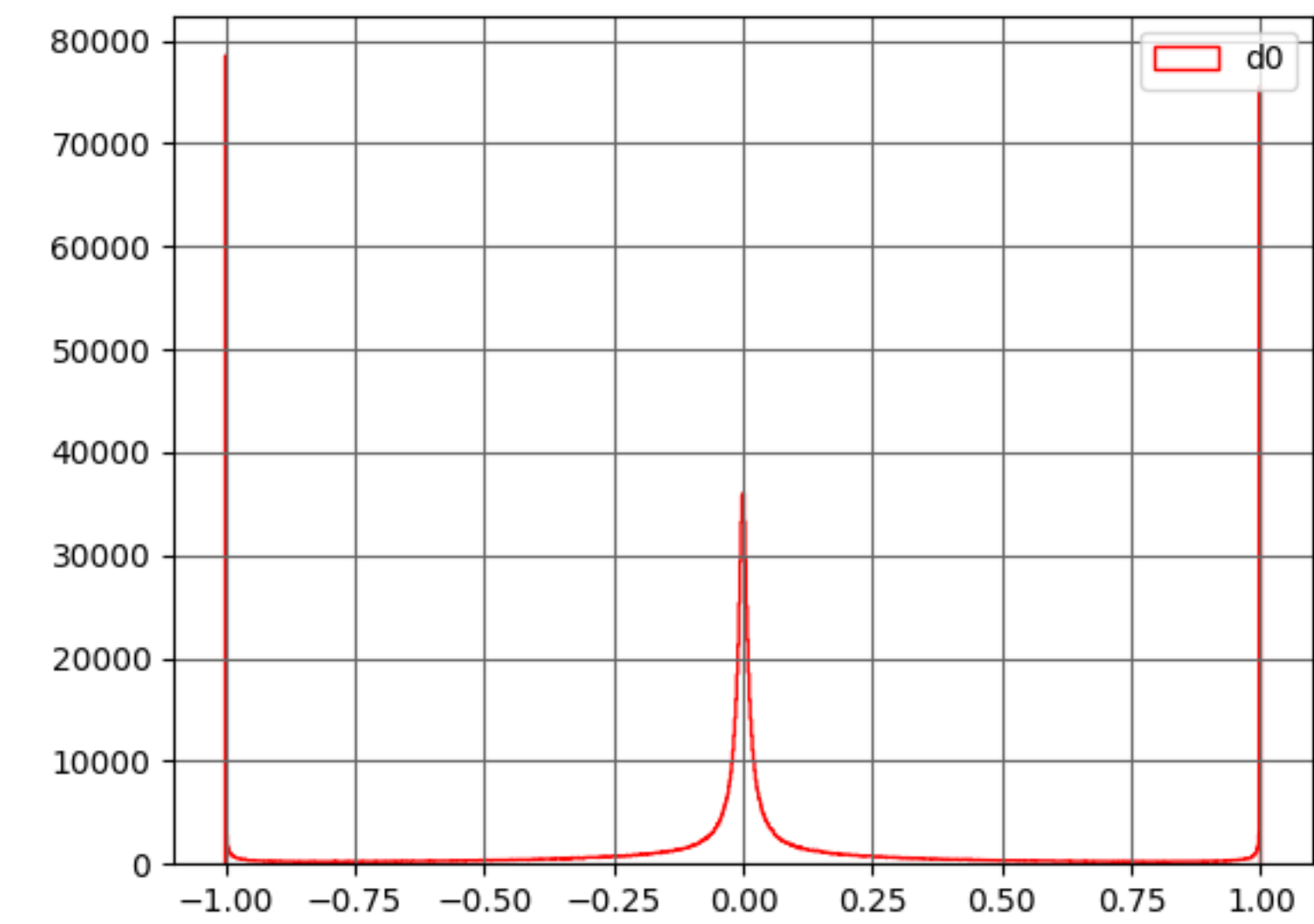


$\tan(\lambda)$

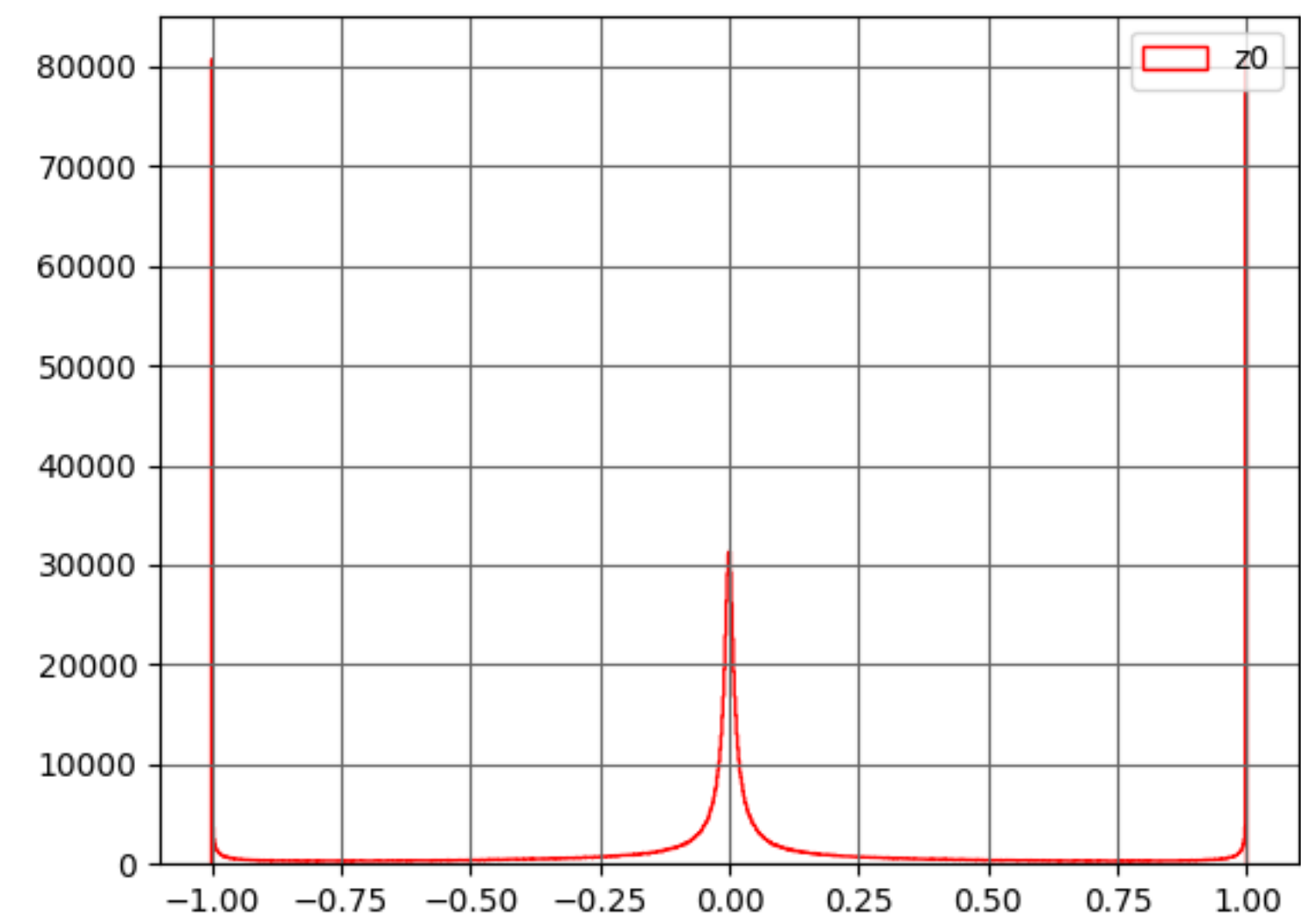


Energy

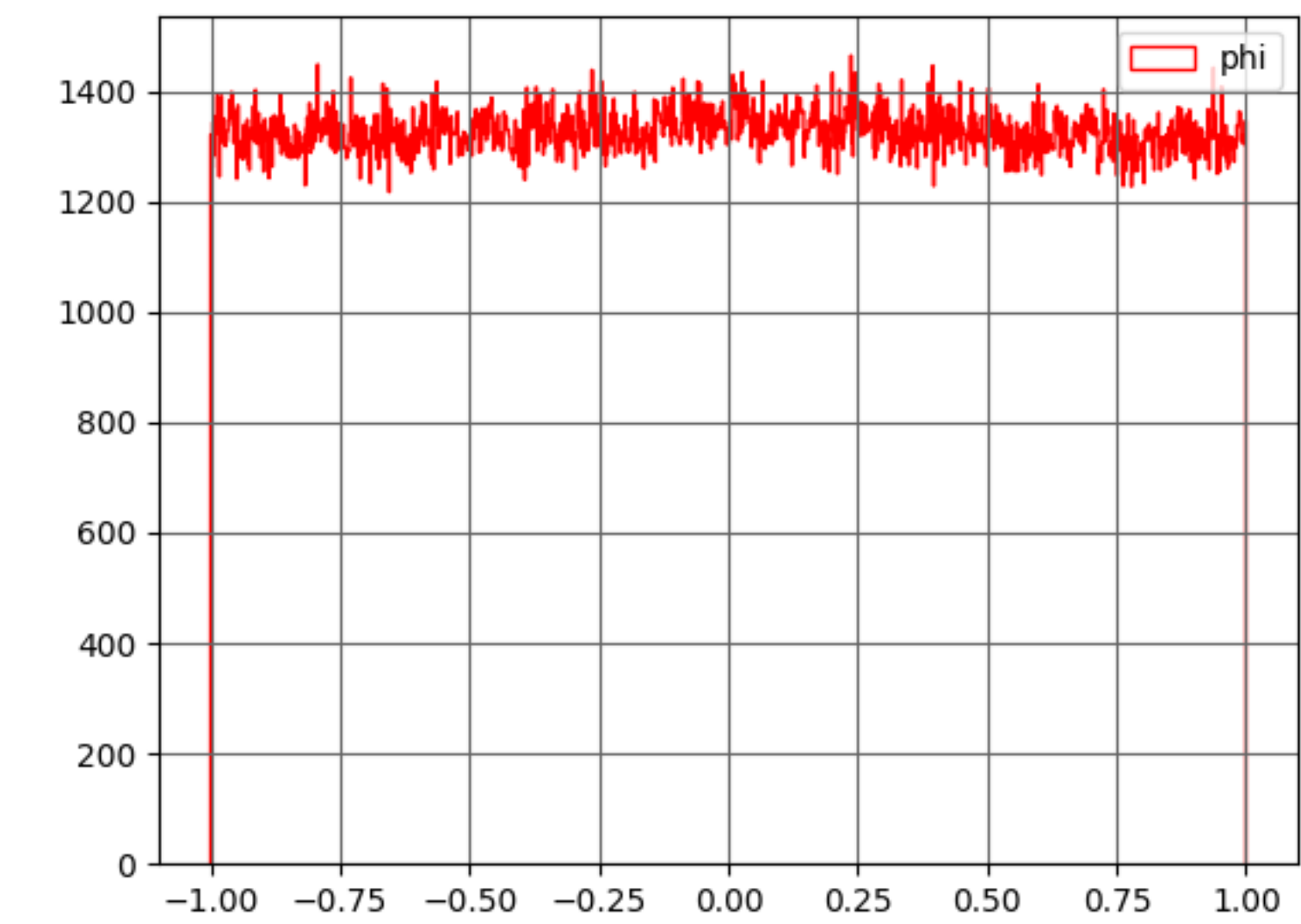
終状態 $b\bar{b}$



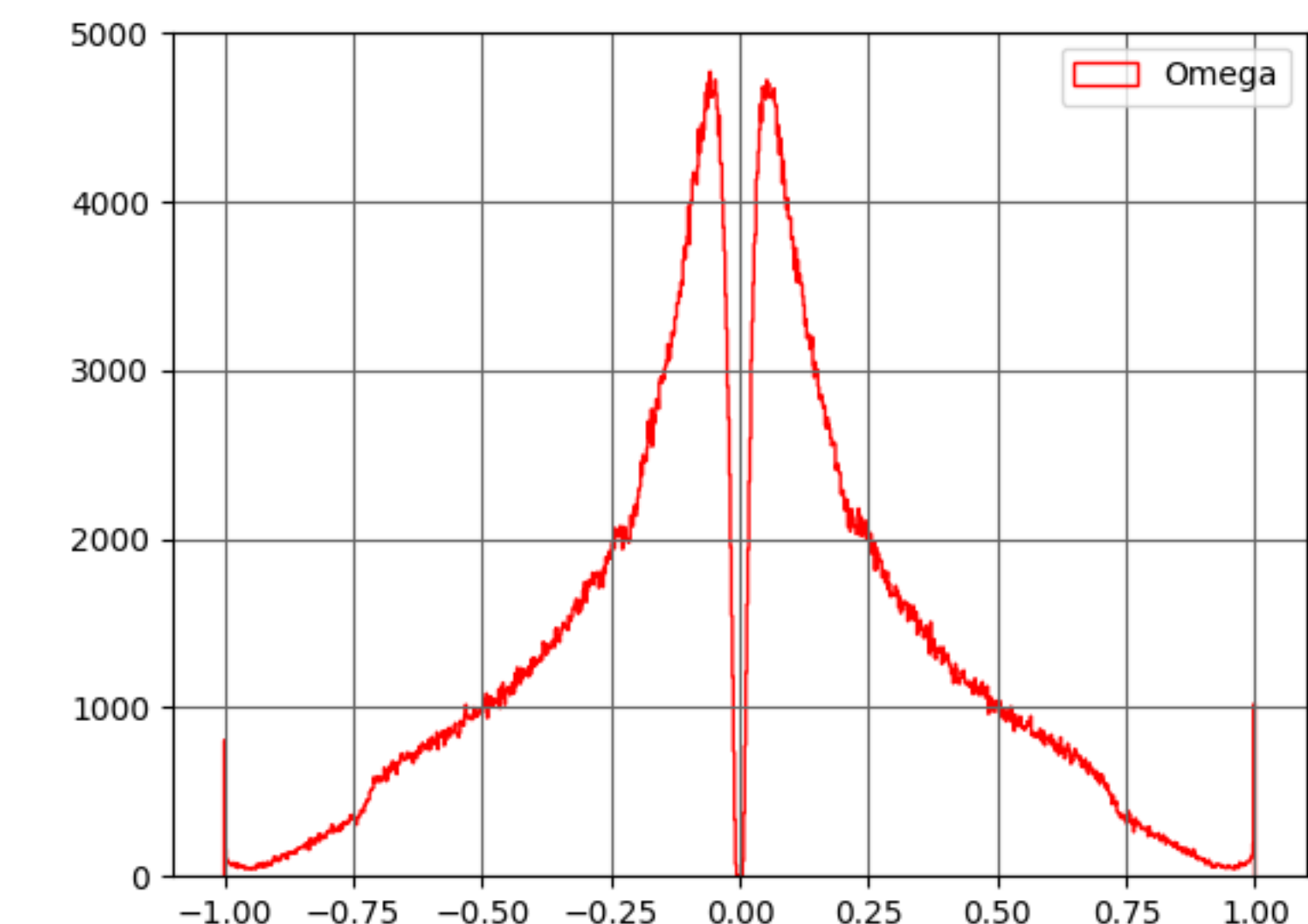
d_0



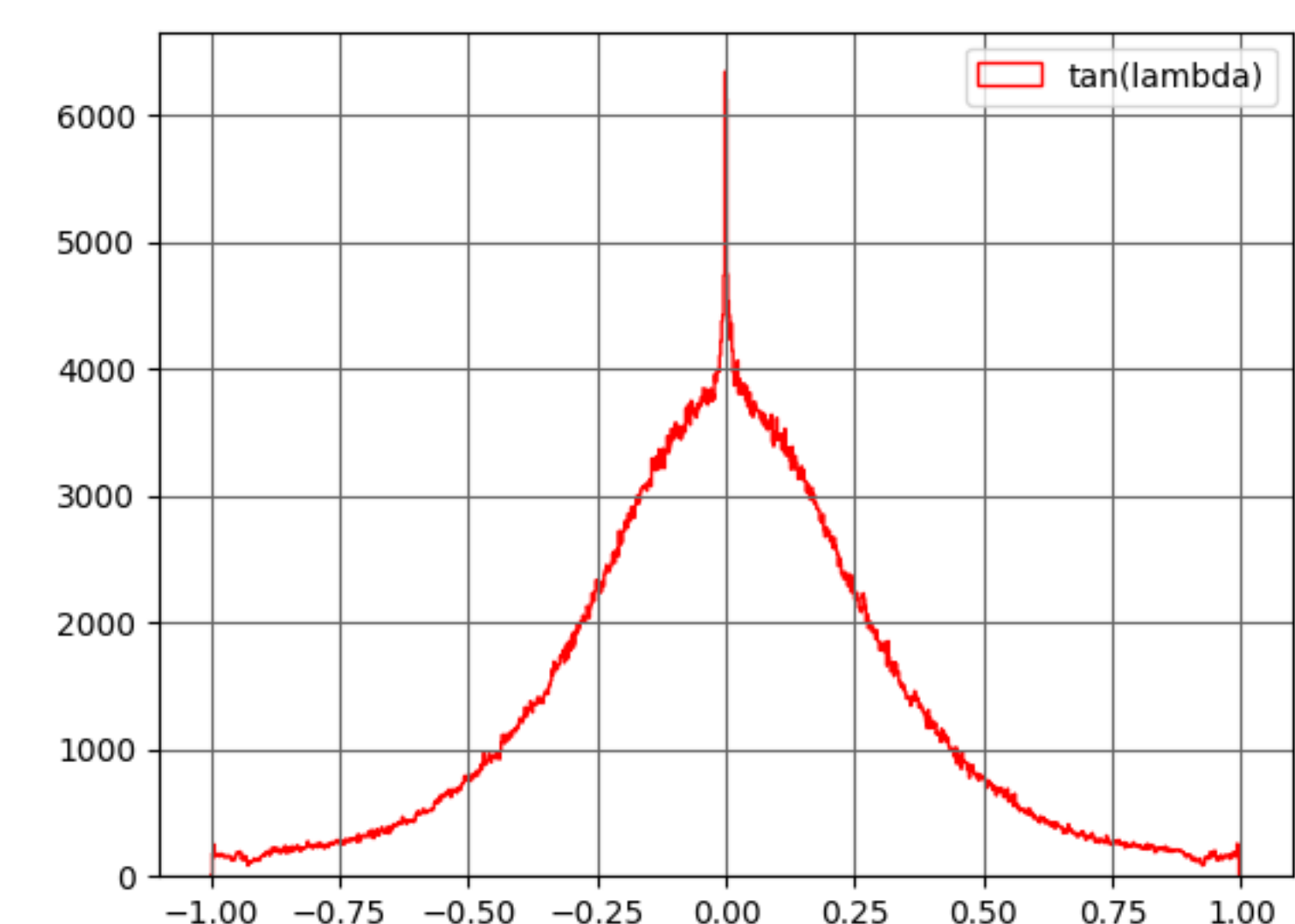
z_0



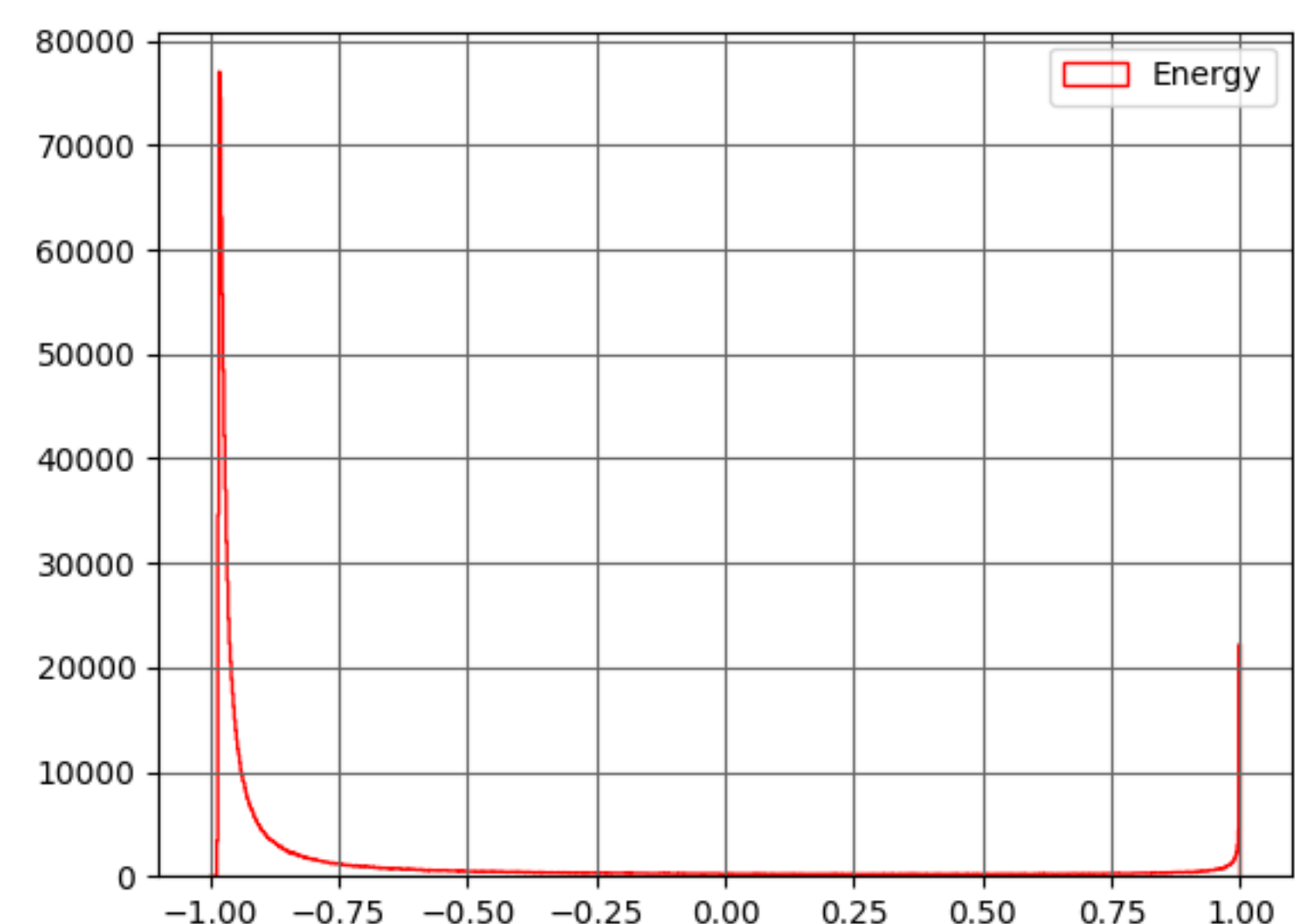
ϕ



Ω

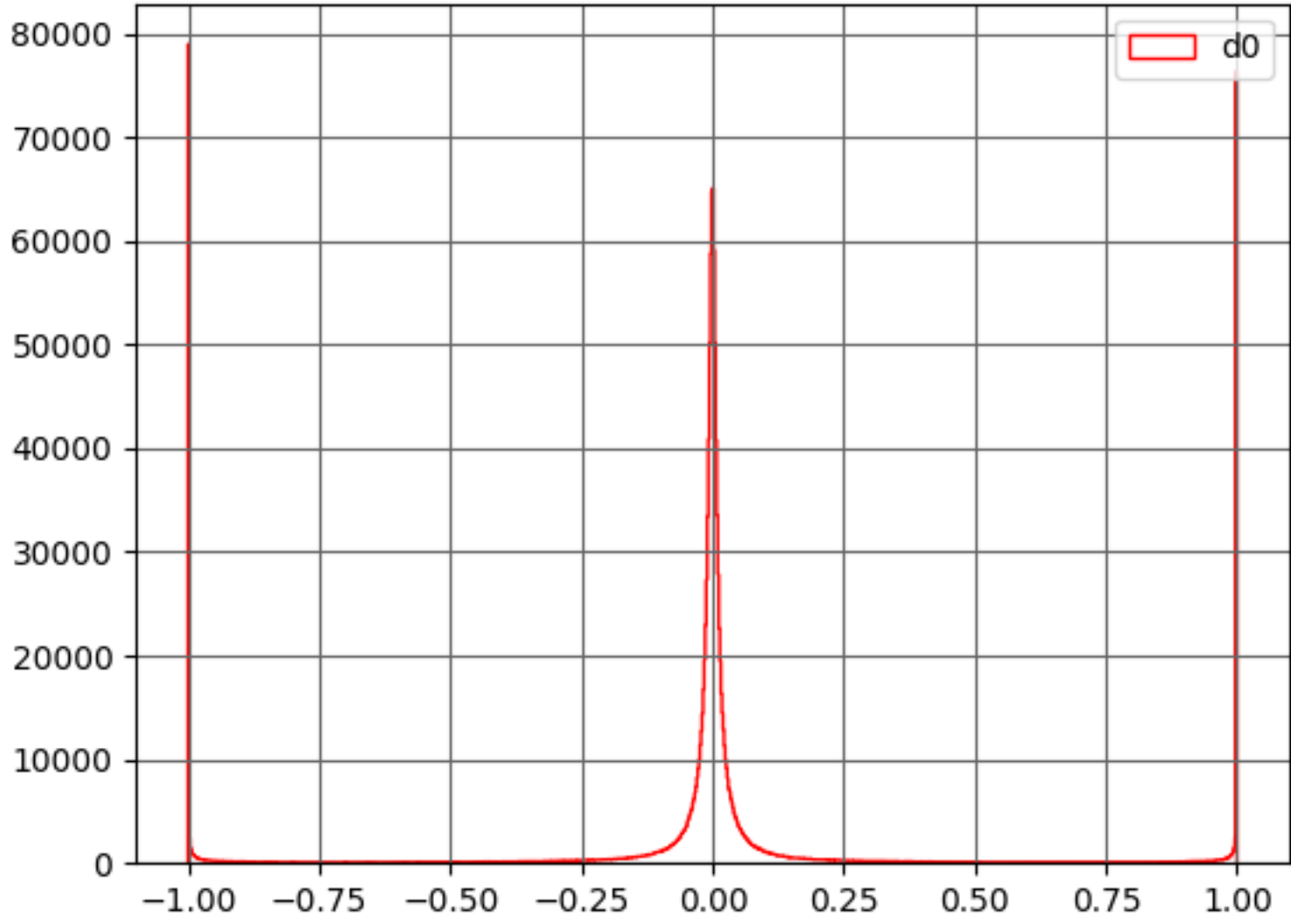


$\tan(\lambda)$

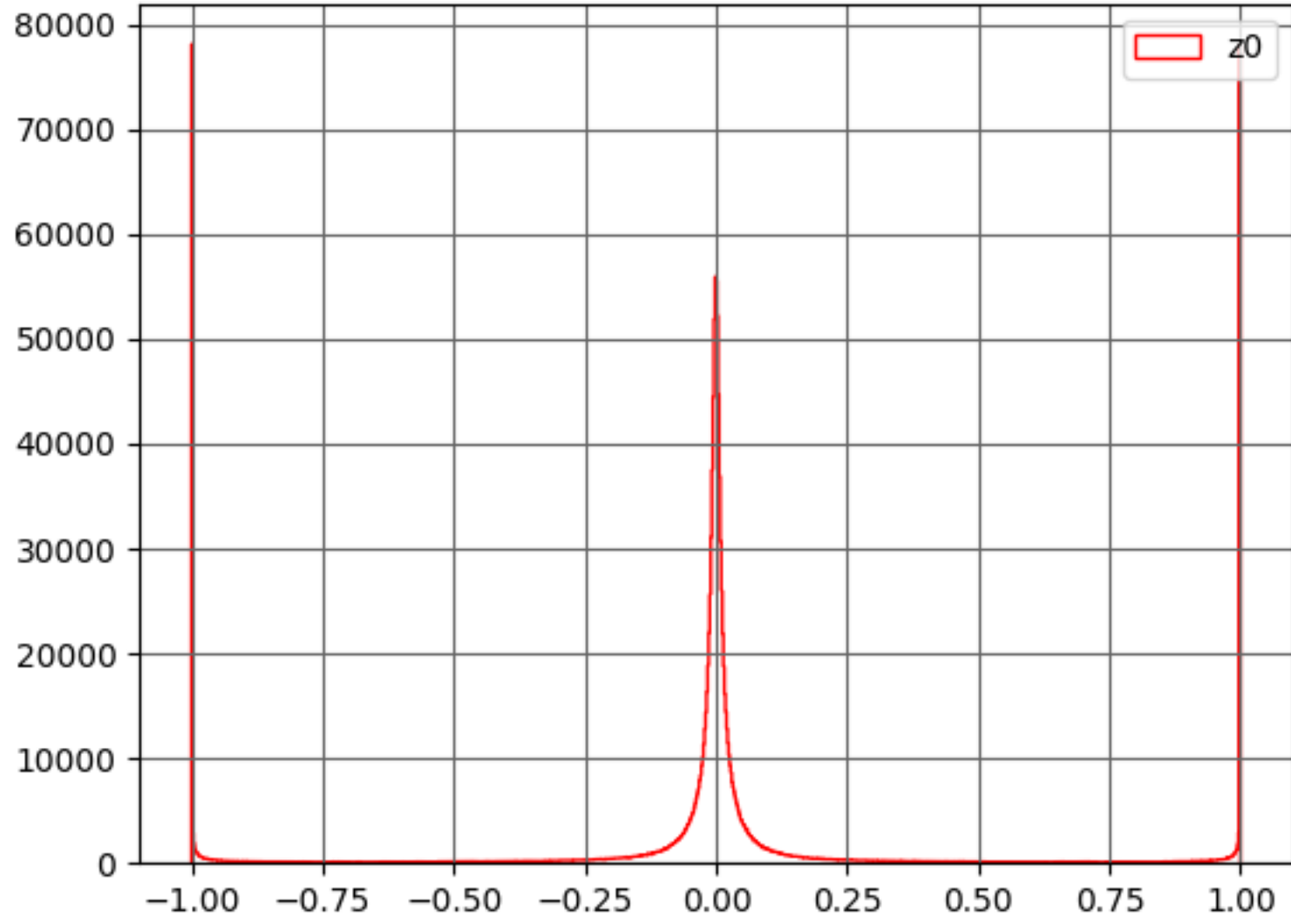


Energy

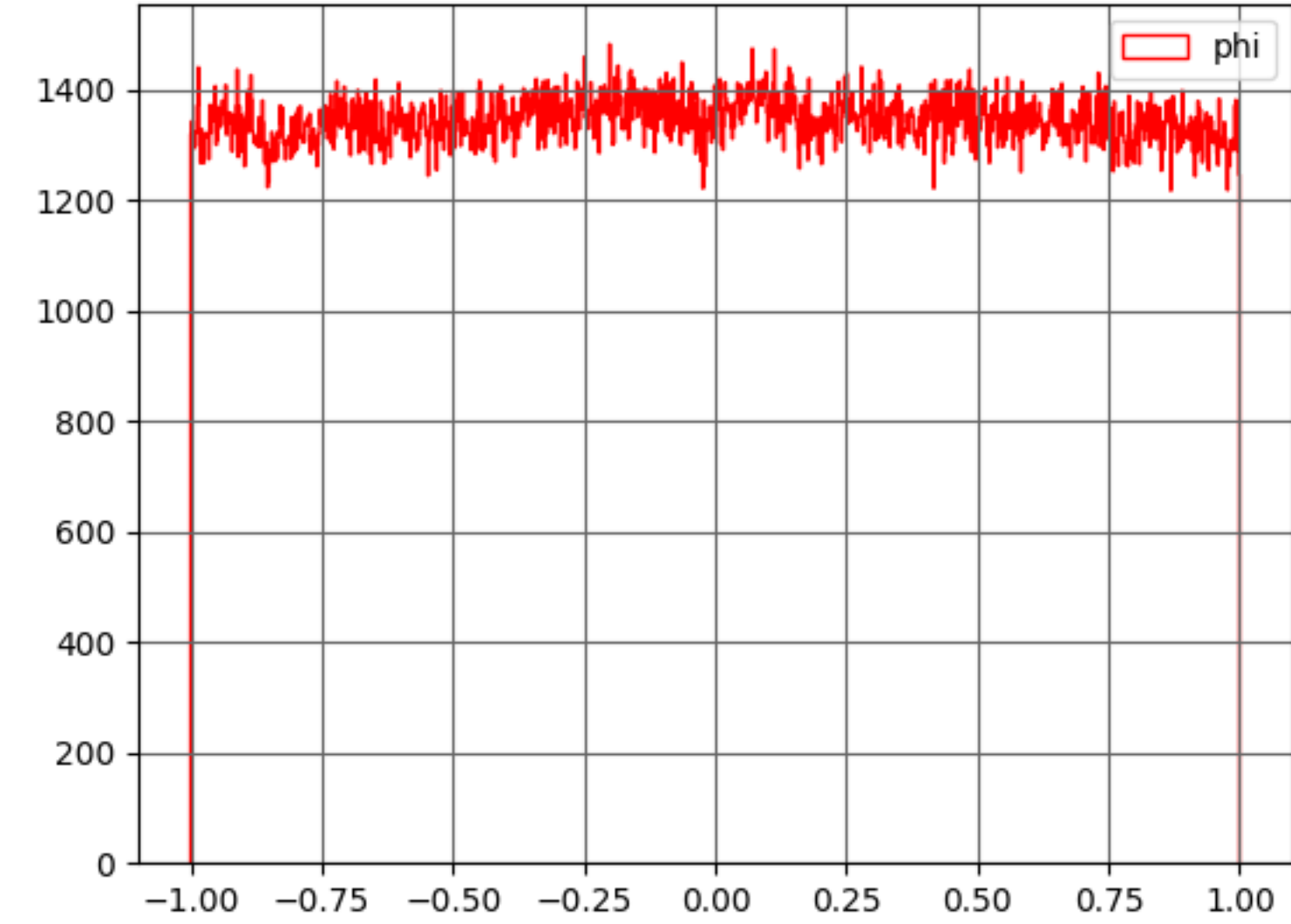
終状態 $c\bar{c}$



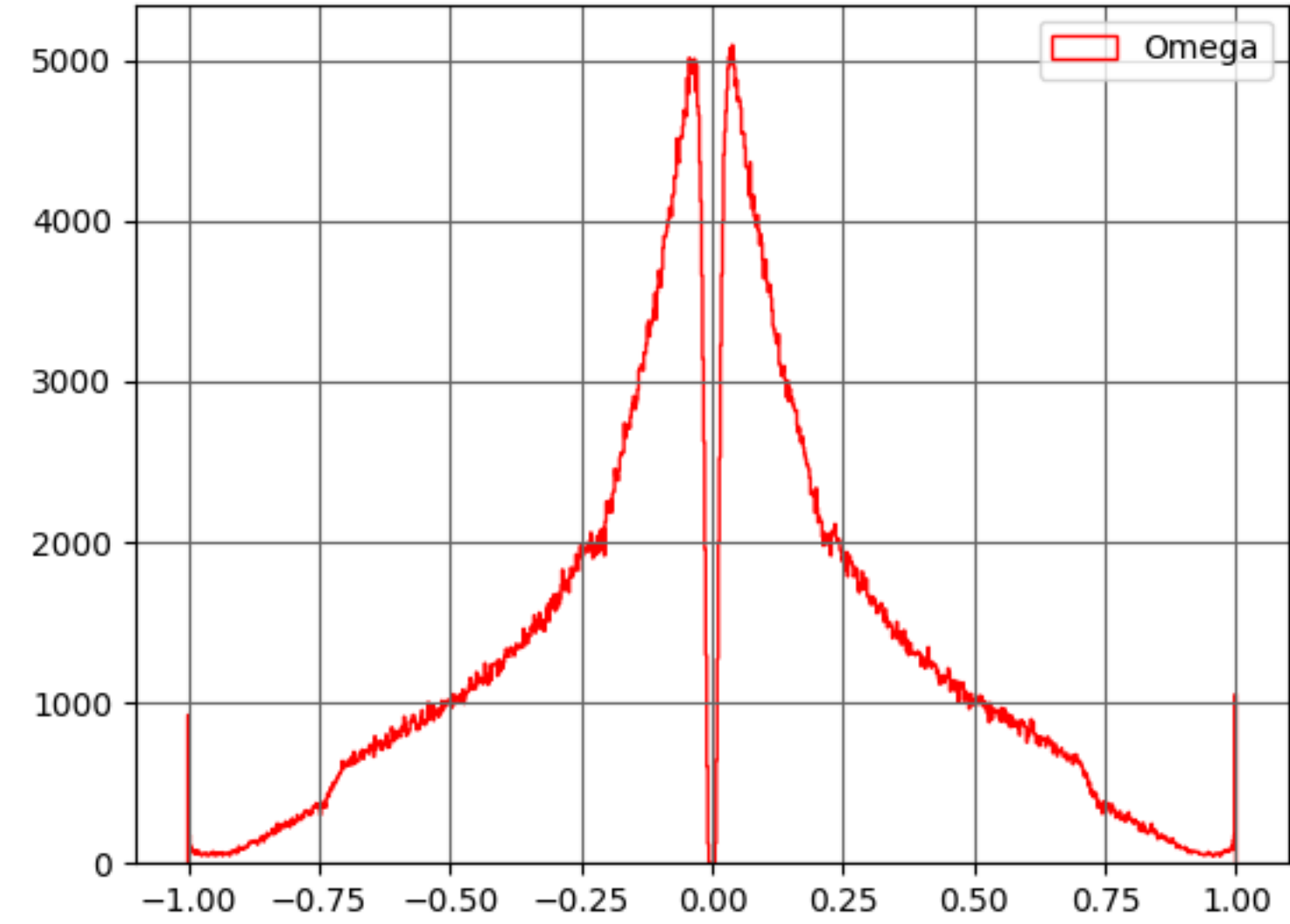
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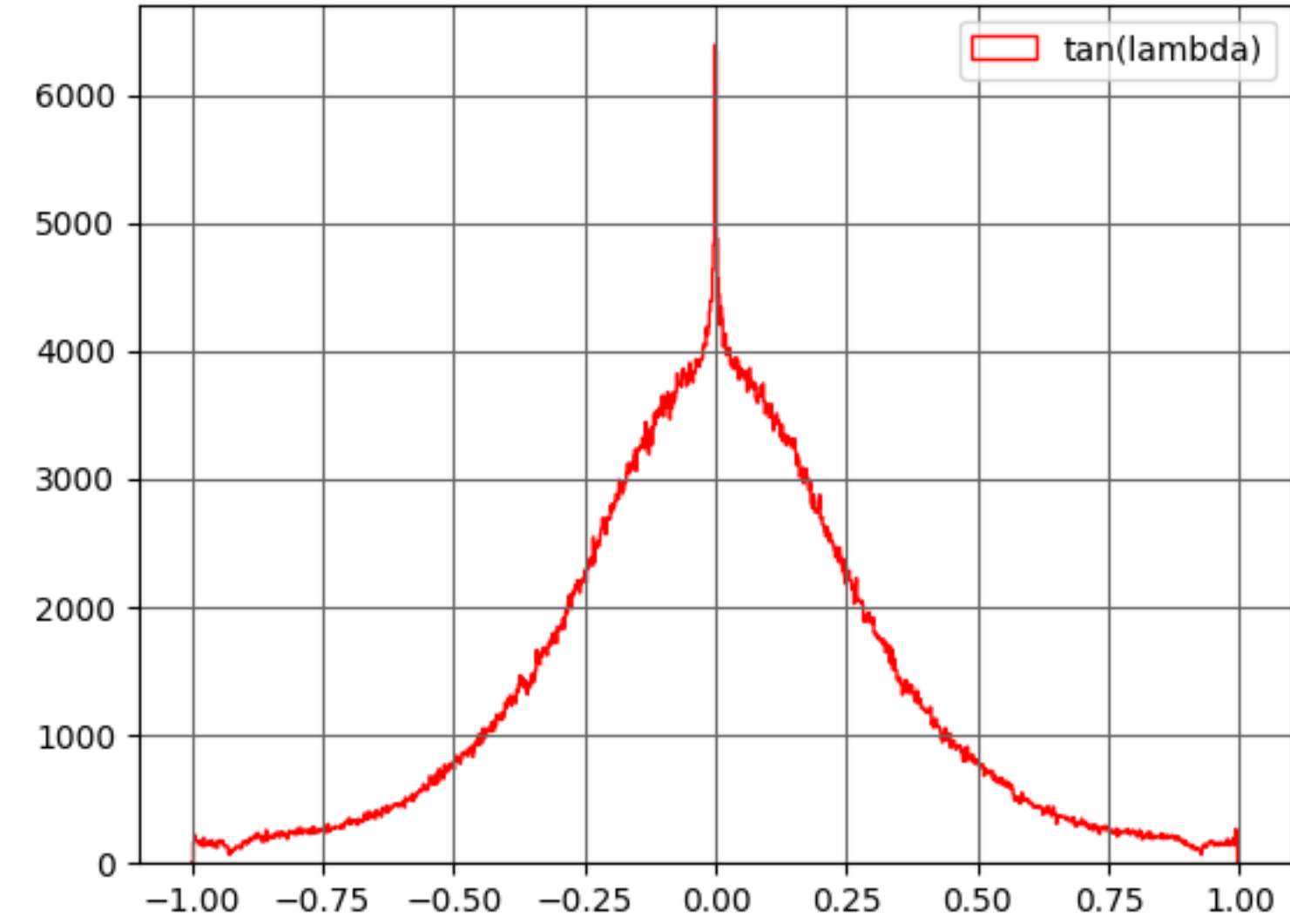
z_0



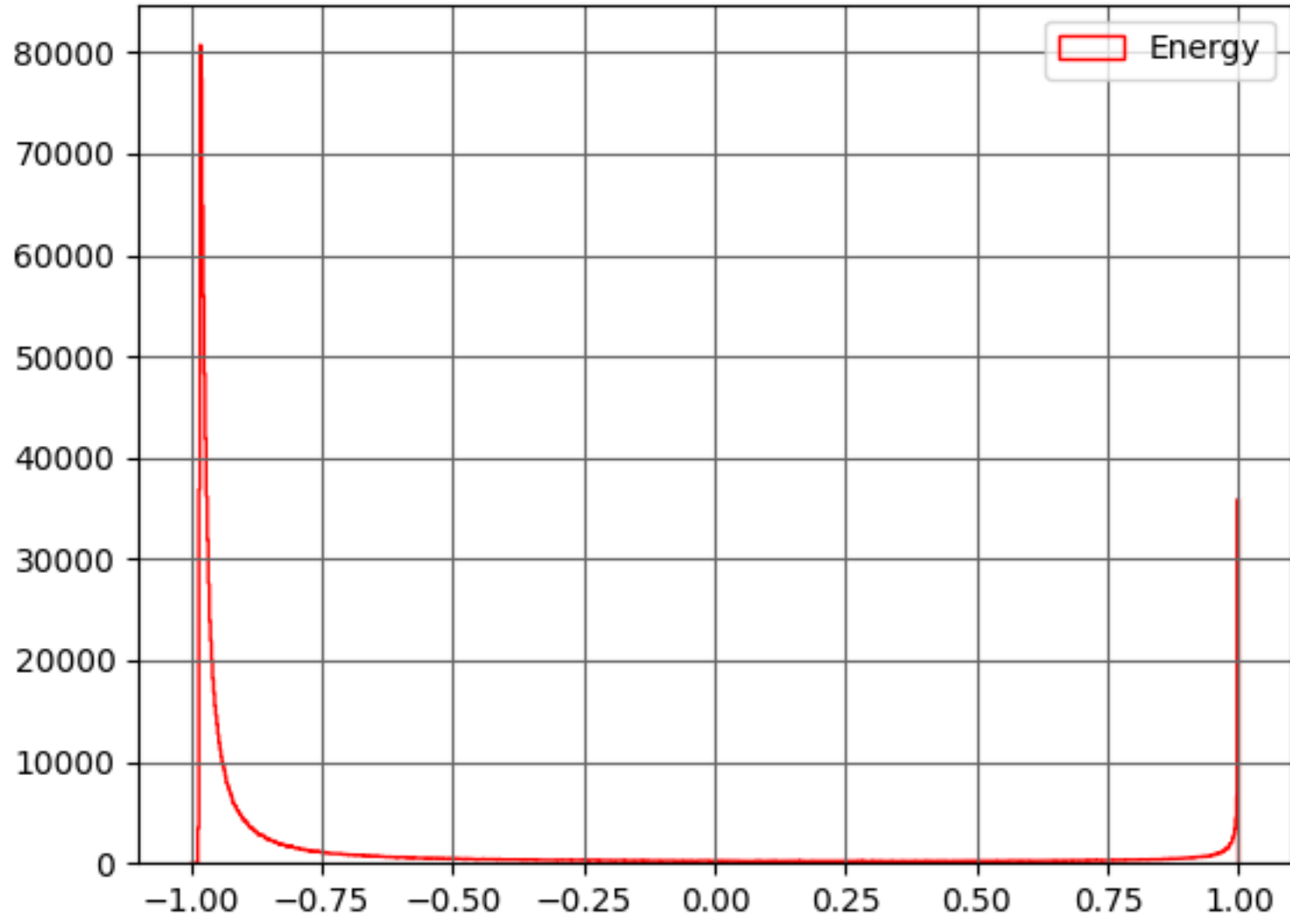
ϕ



Ω

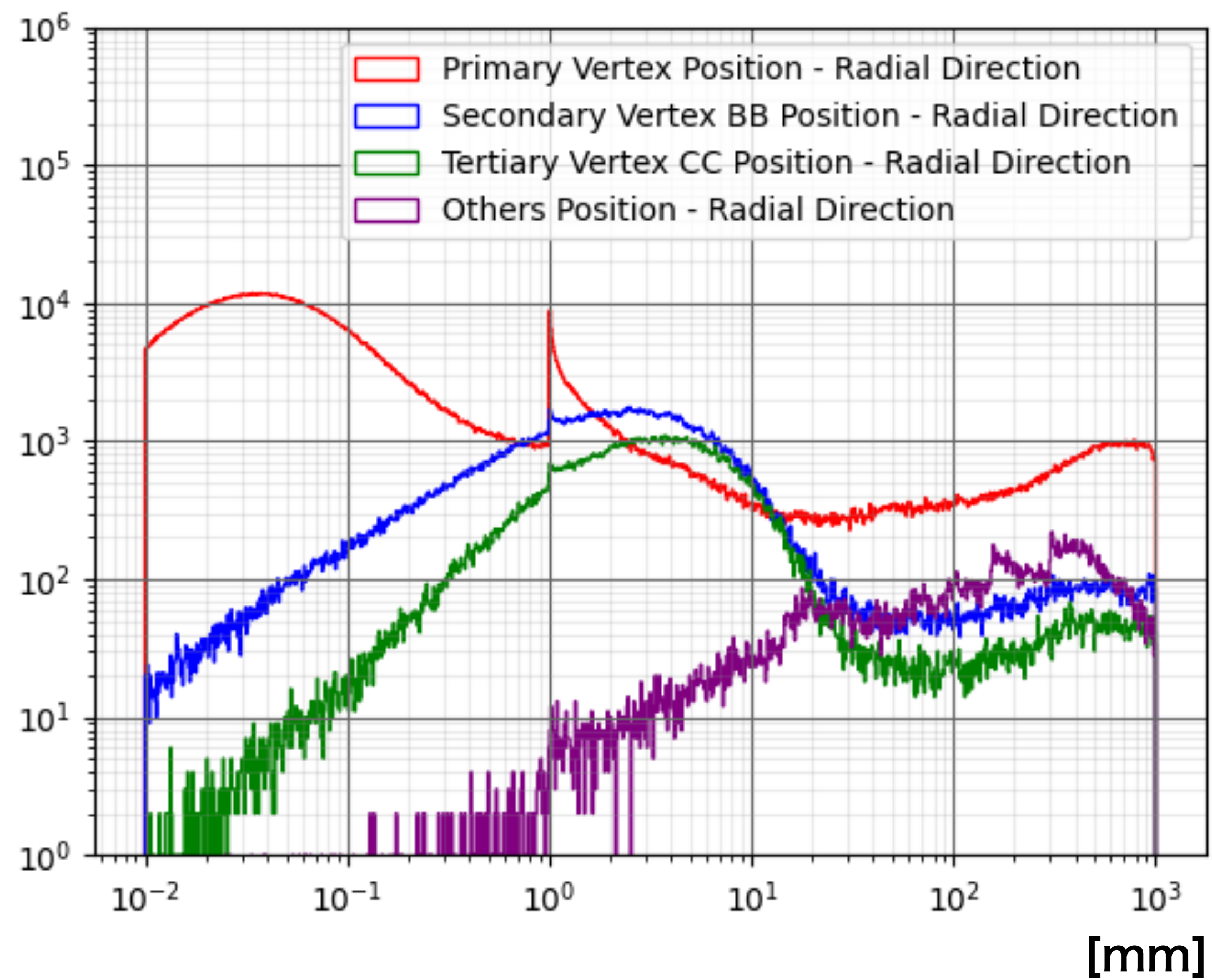


$\tan(\lambda)$

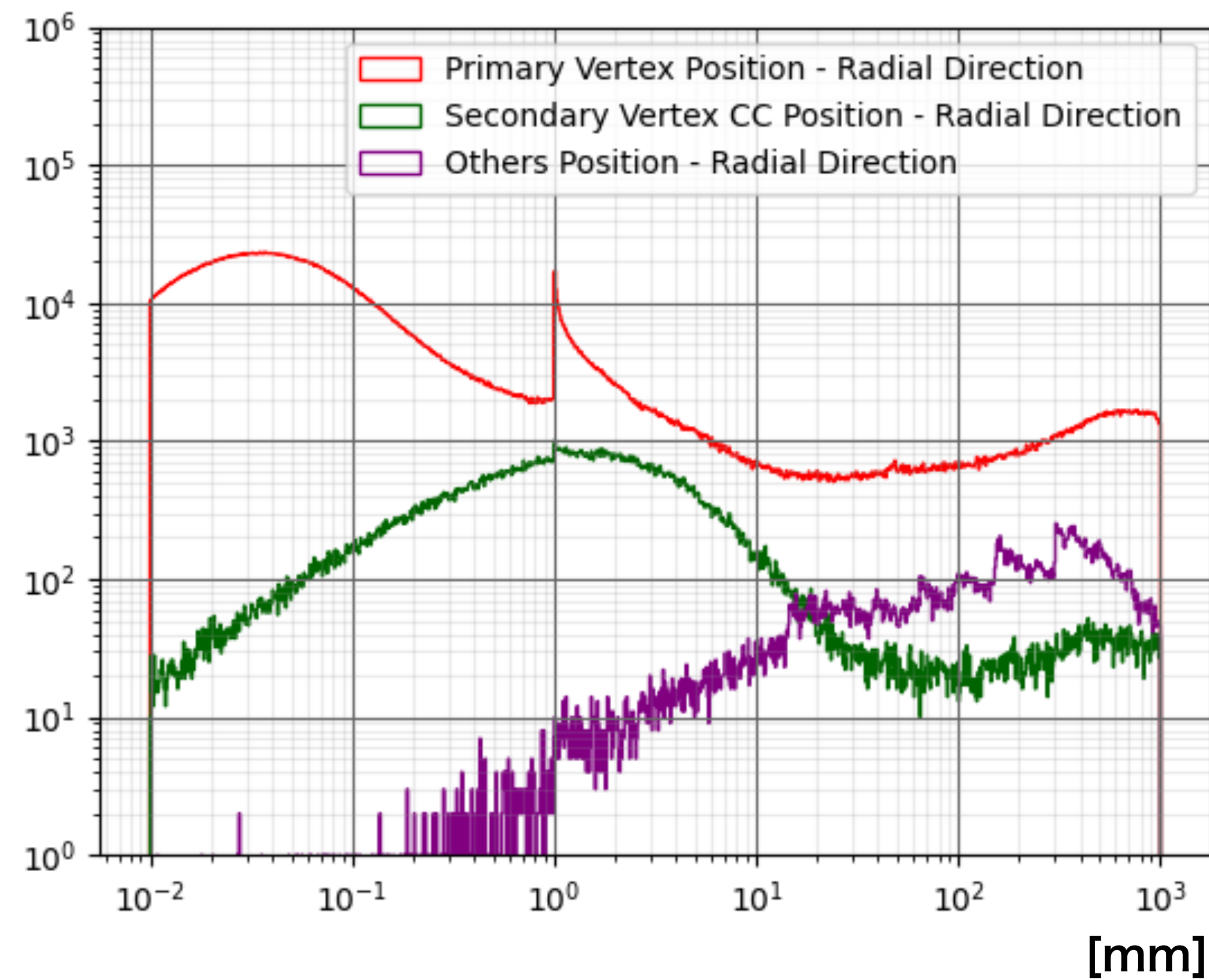


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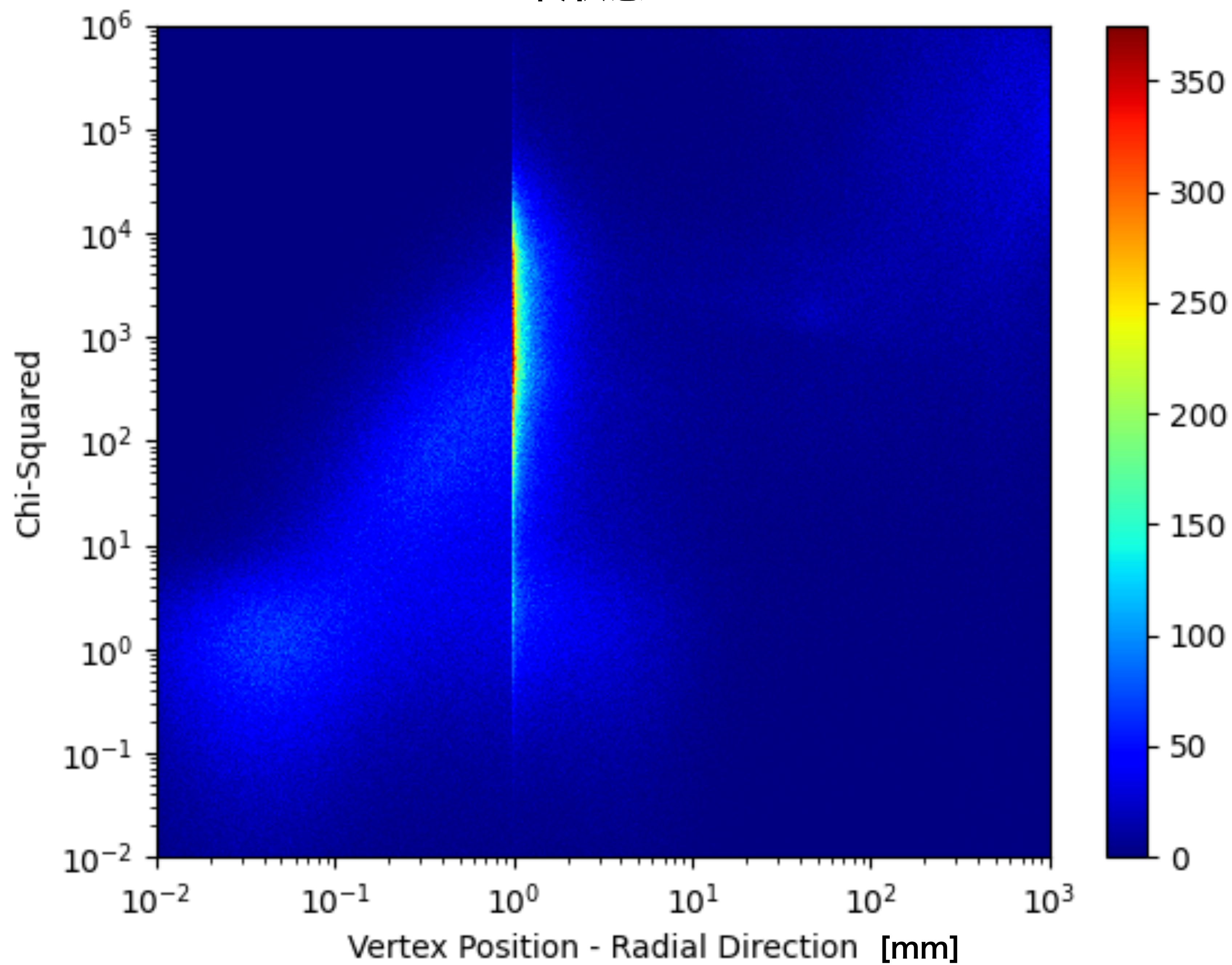
終状態 $b\bar{b}$



終状態 $c\bar{c}$



終状態 $b\bar{b}$

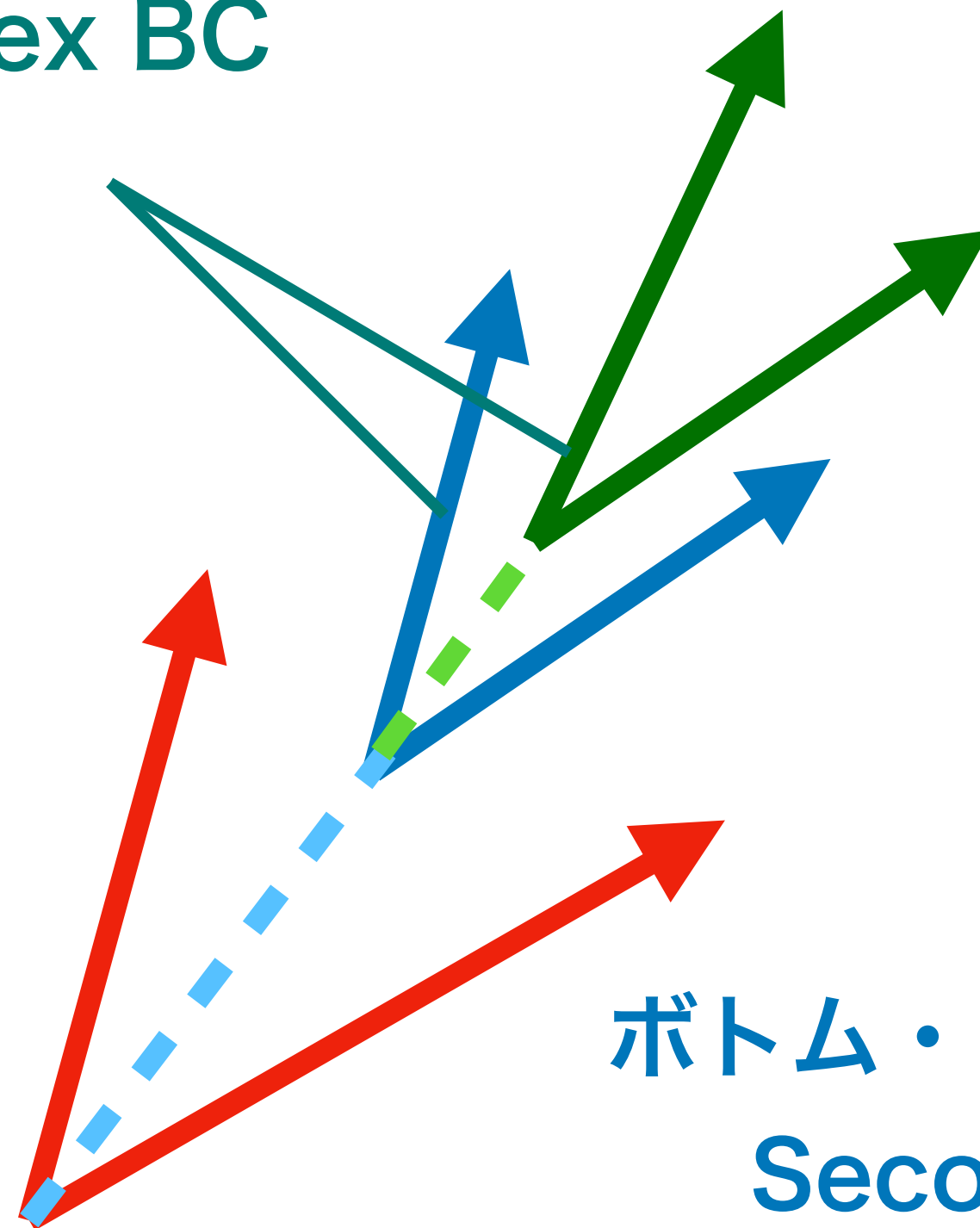


Secondary Vertex BC
(SVBC)

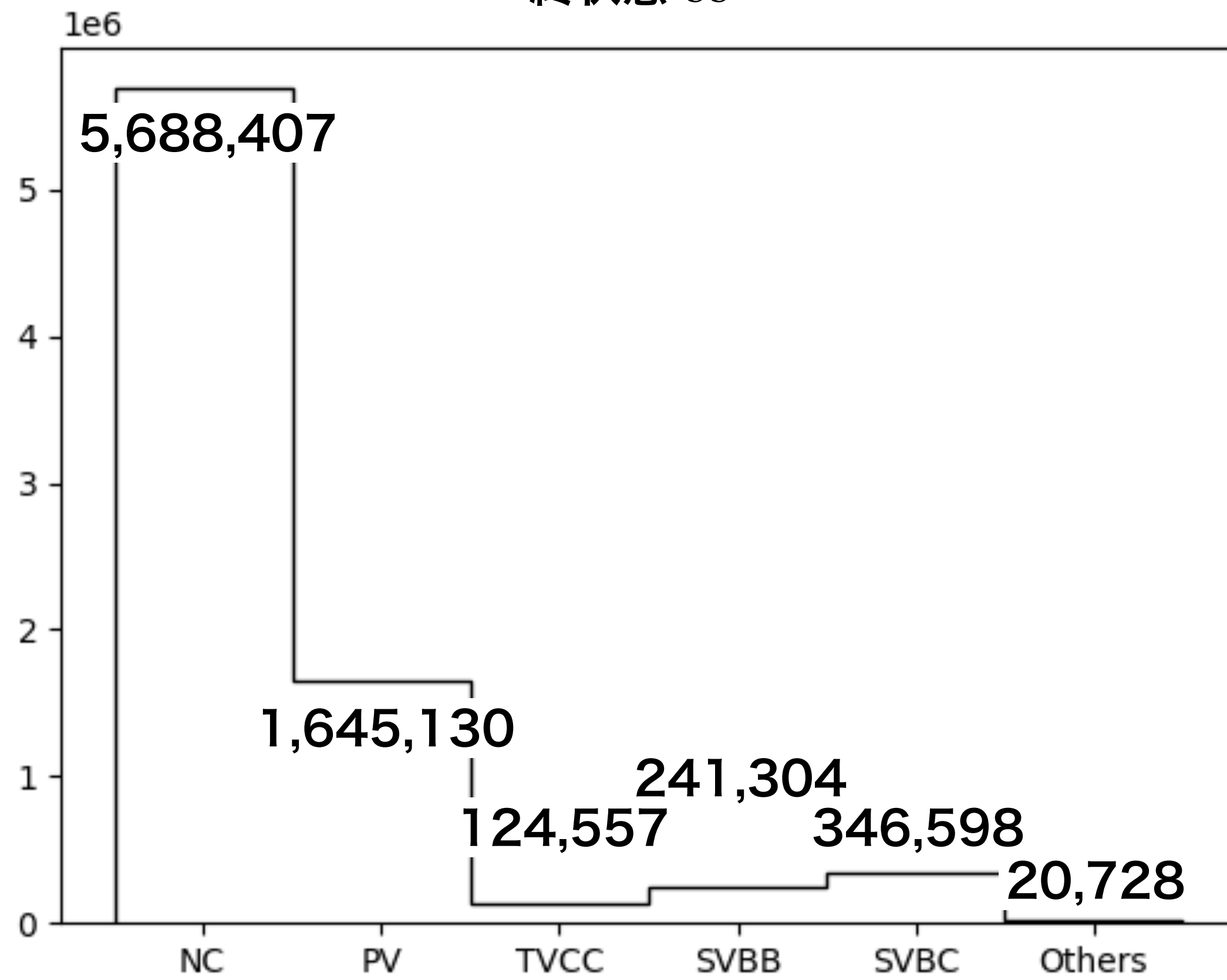
チャーム・フレーバーのハドロンによる
Tertiary Vertex (TBCC)

ボトム・フレーバーのハドロンによる
Secondary Vertex (SVBB)

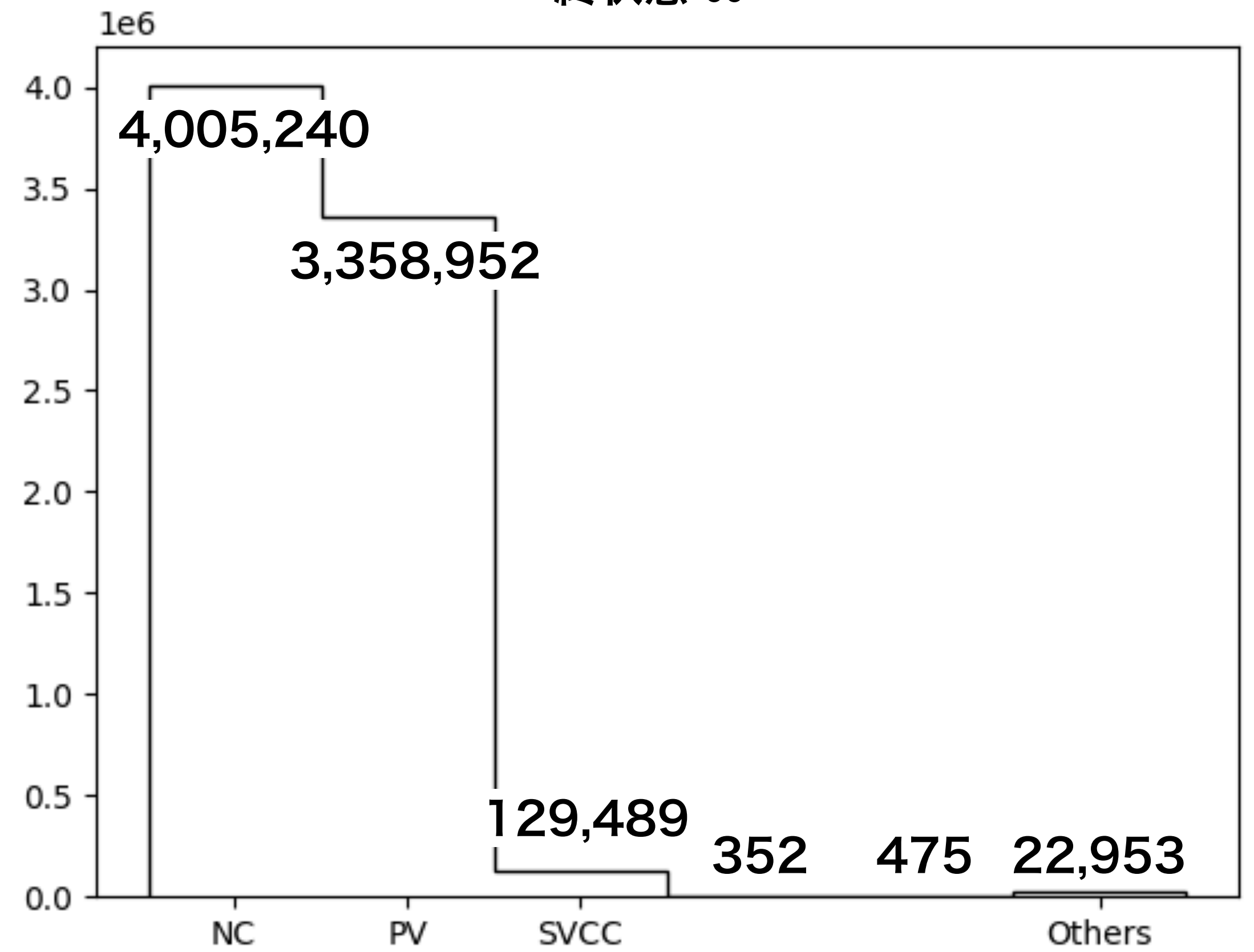
IP
Primary Vertex



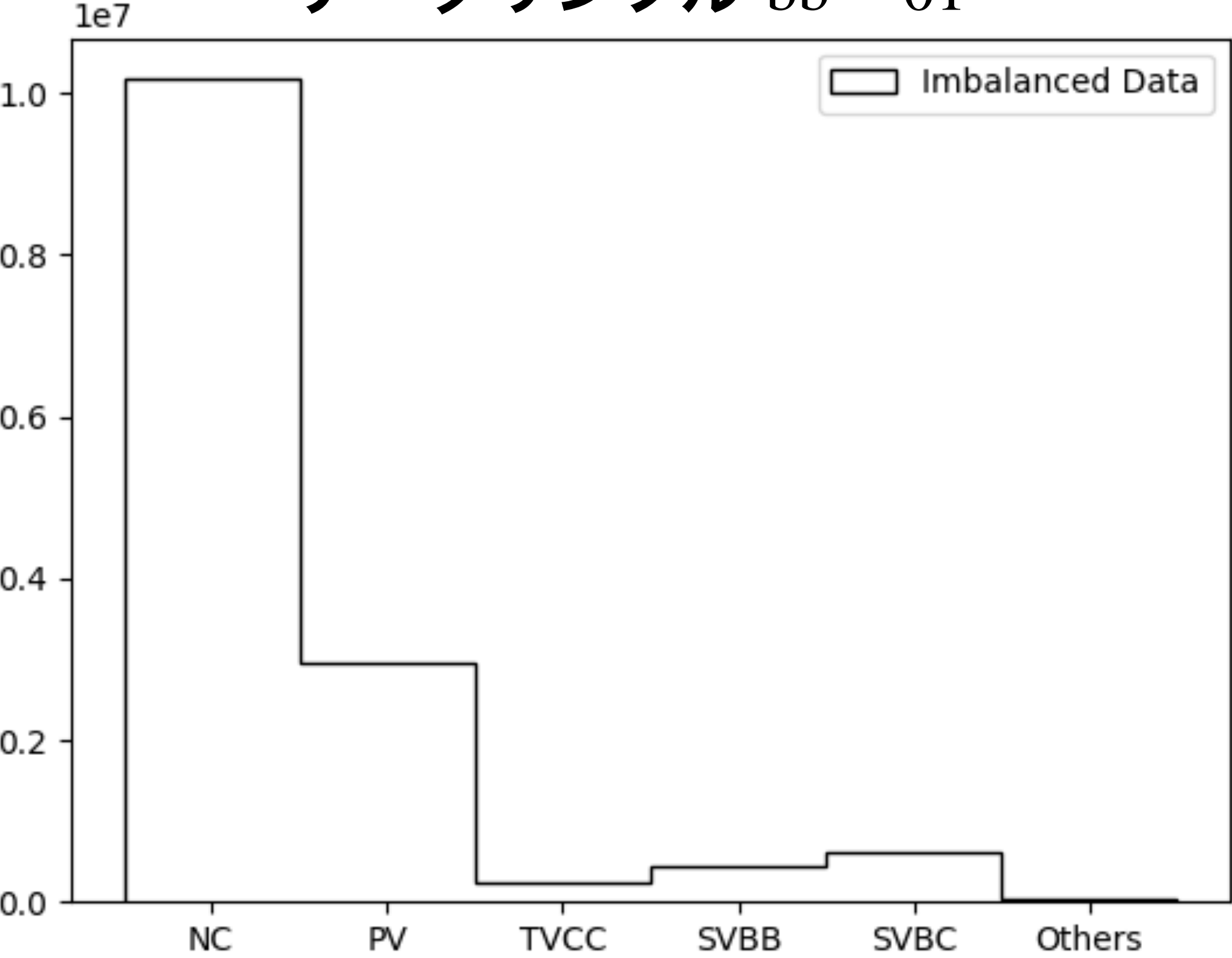
終状態 $b\bar{b}$



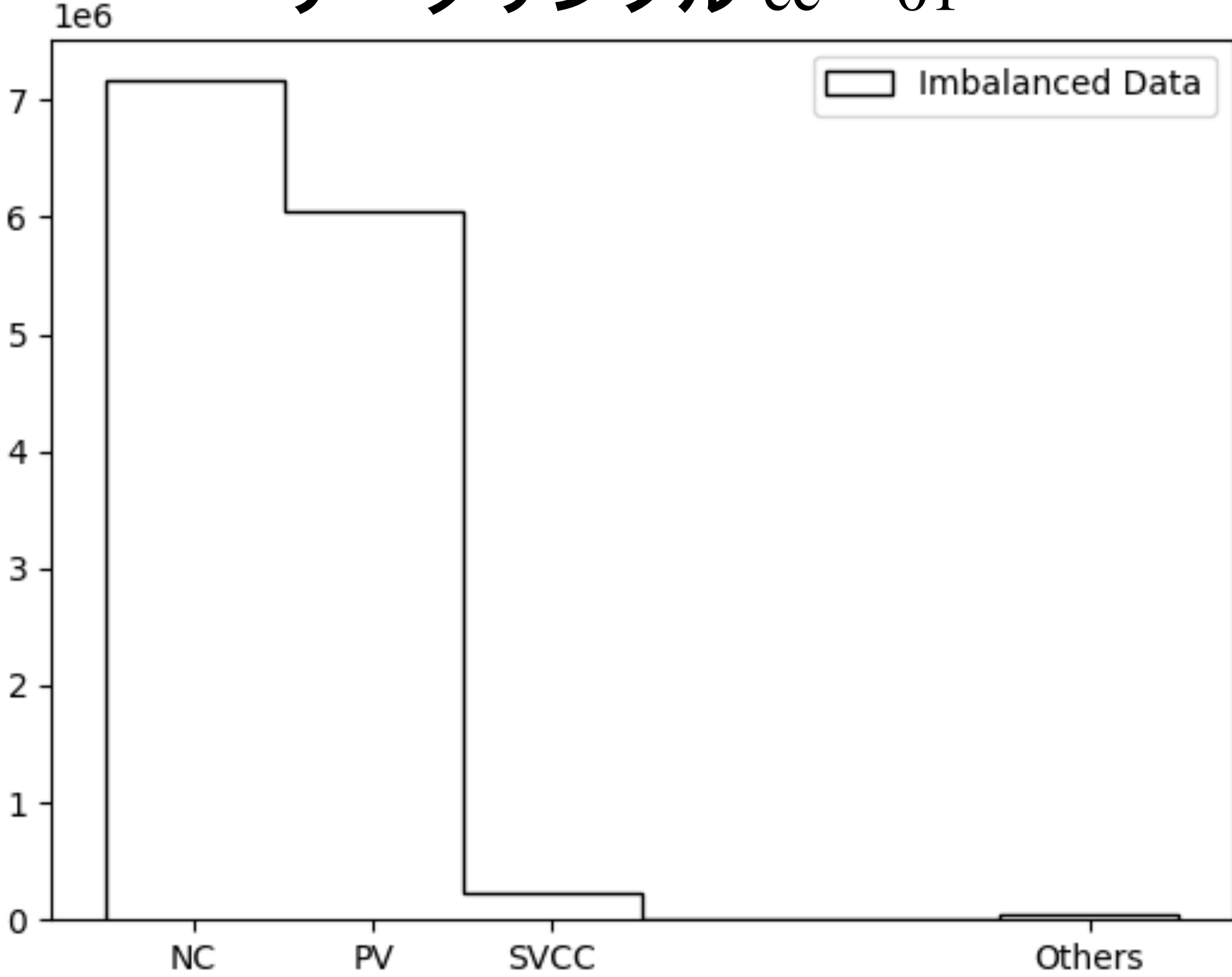
終状態 $c\bar{c}$



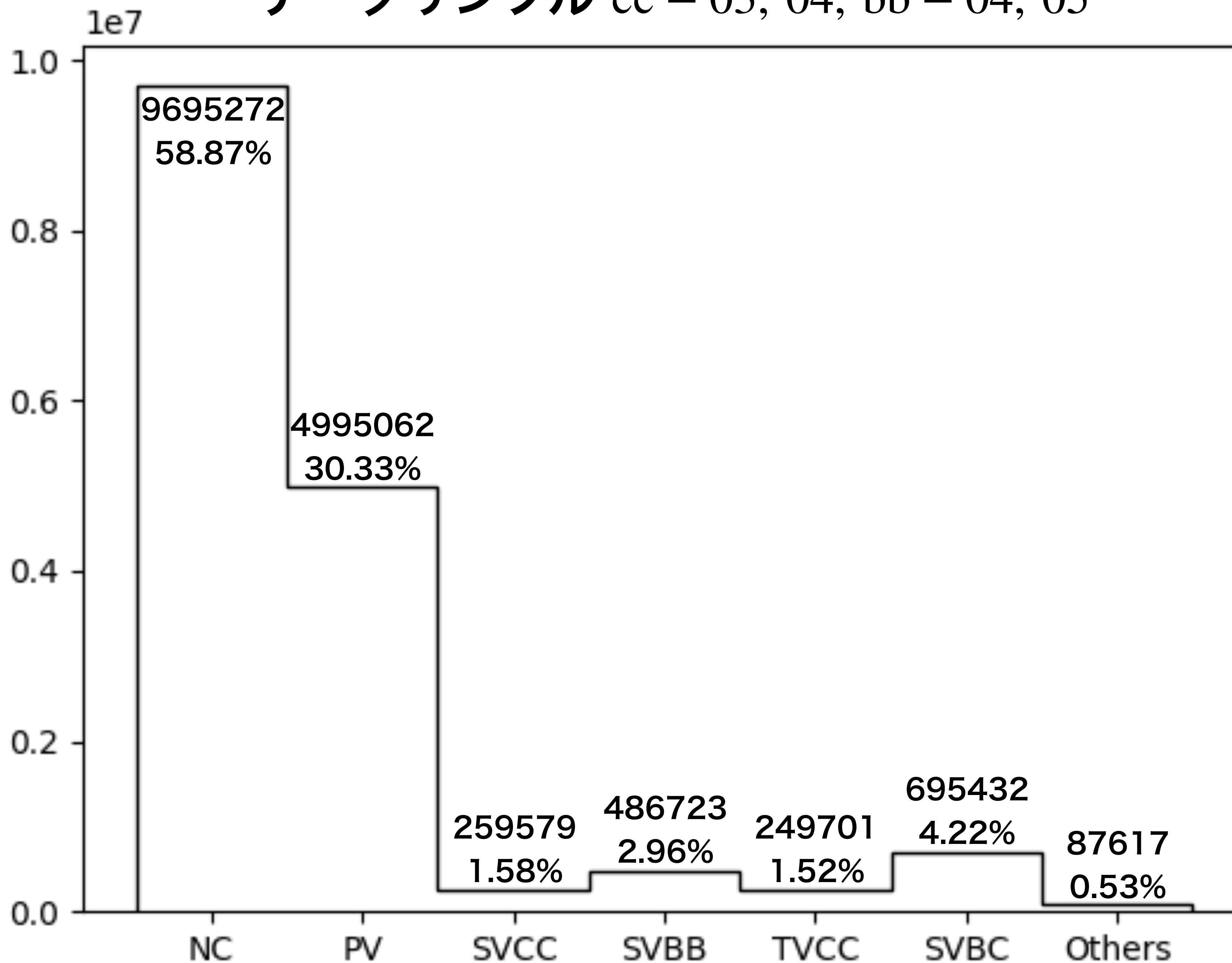
データサンプル $b\bar{b} - 01$

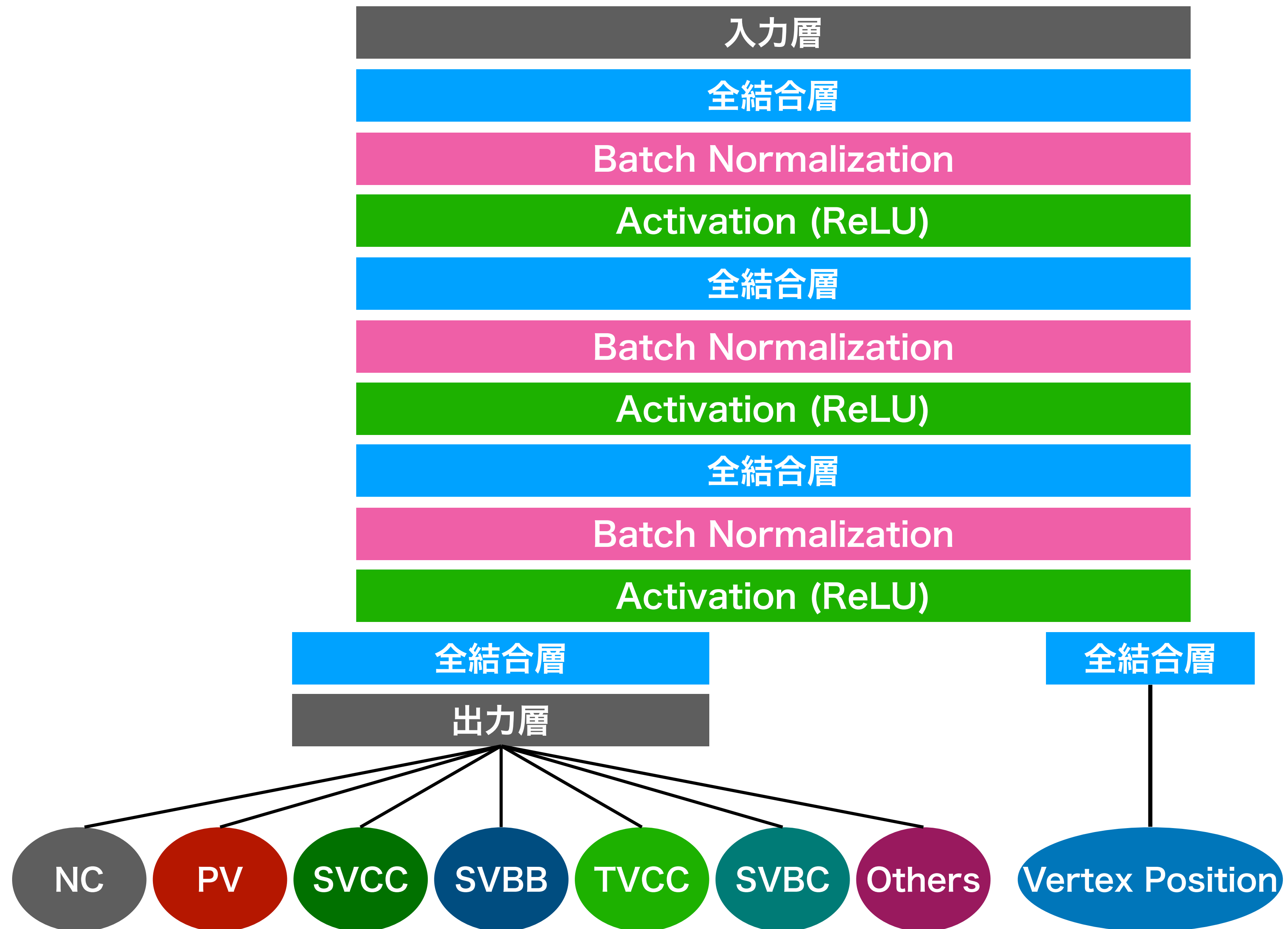


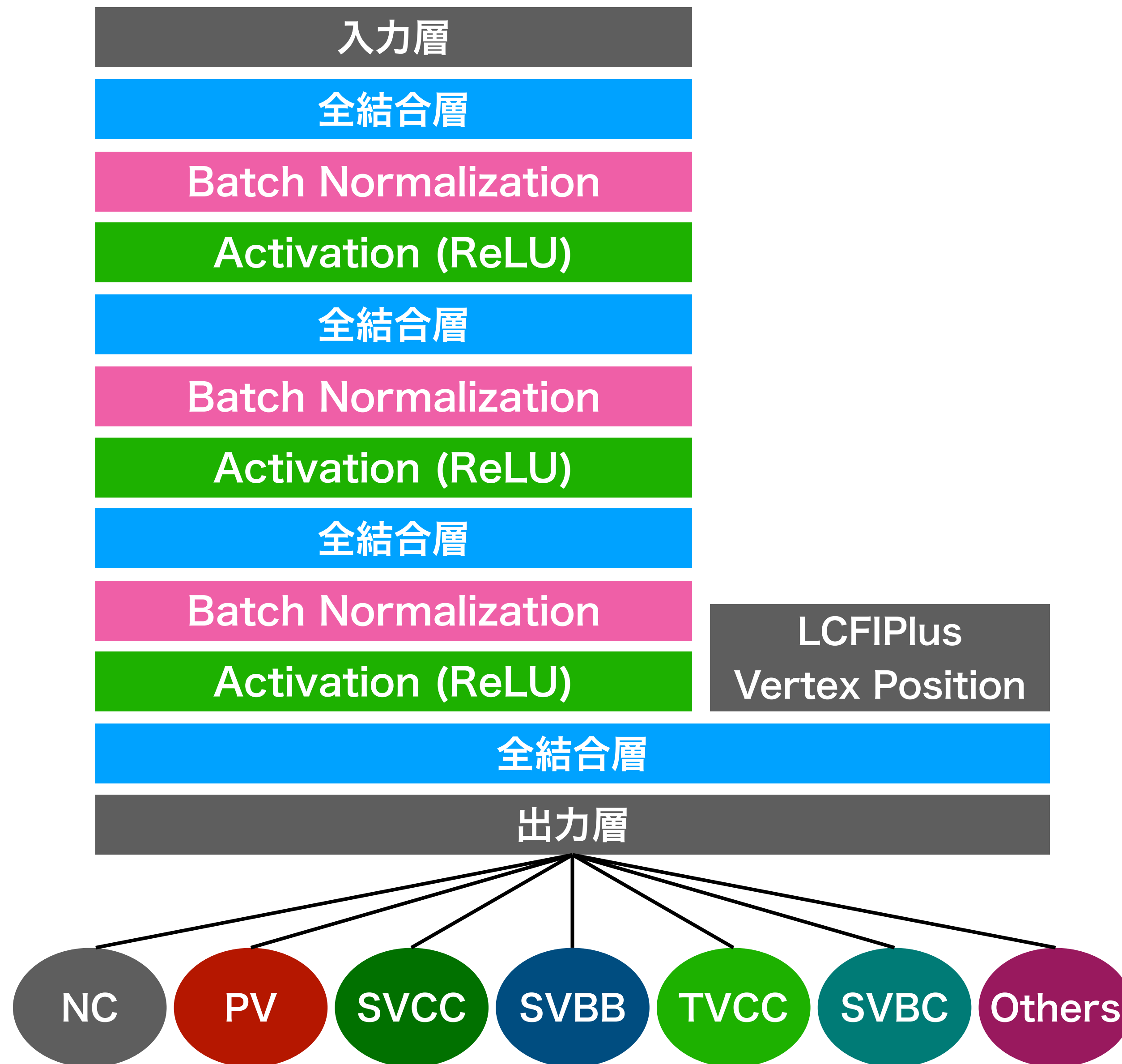
データサンプル $c\bar{c} - 01$

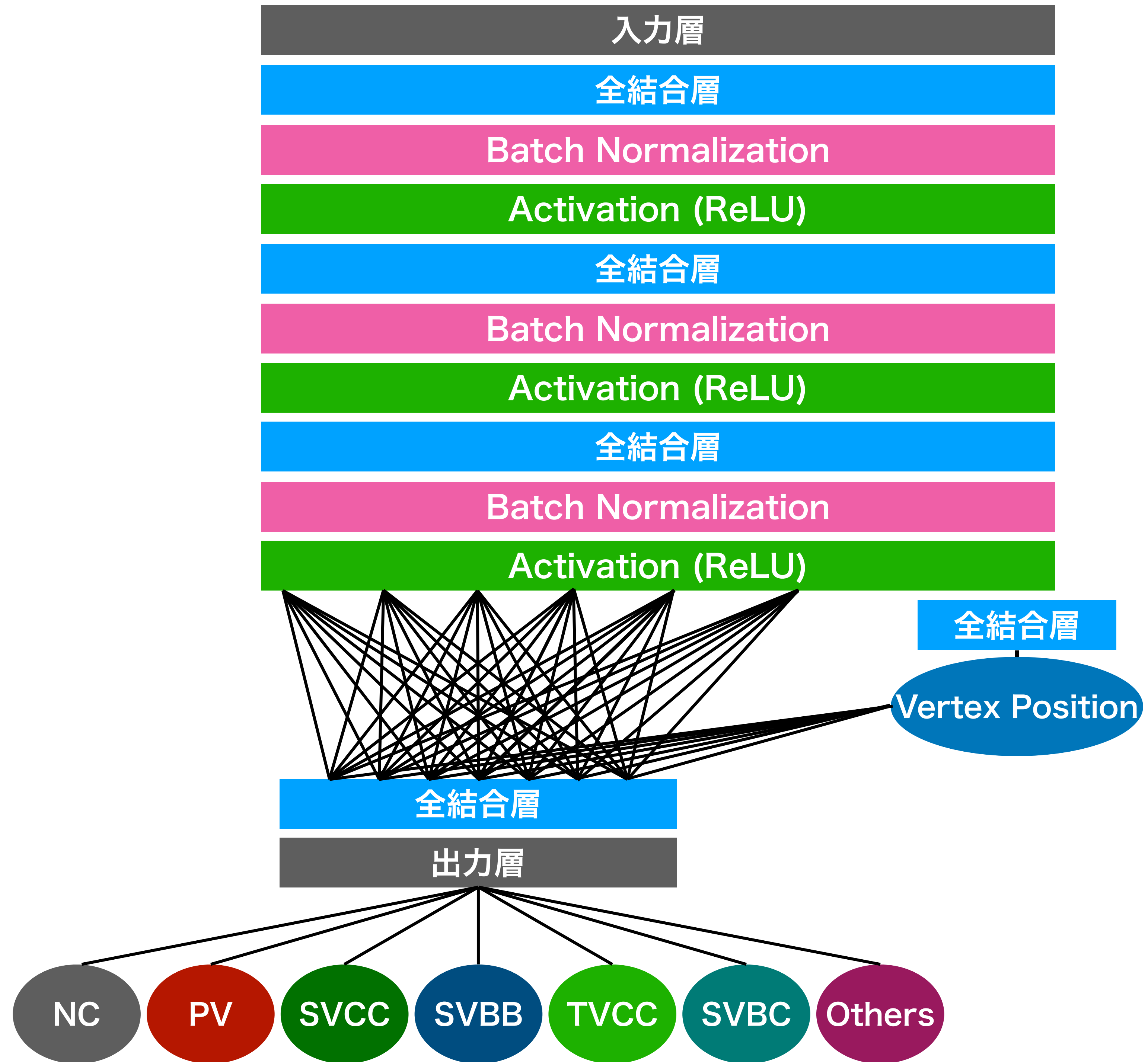


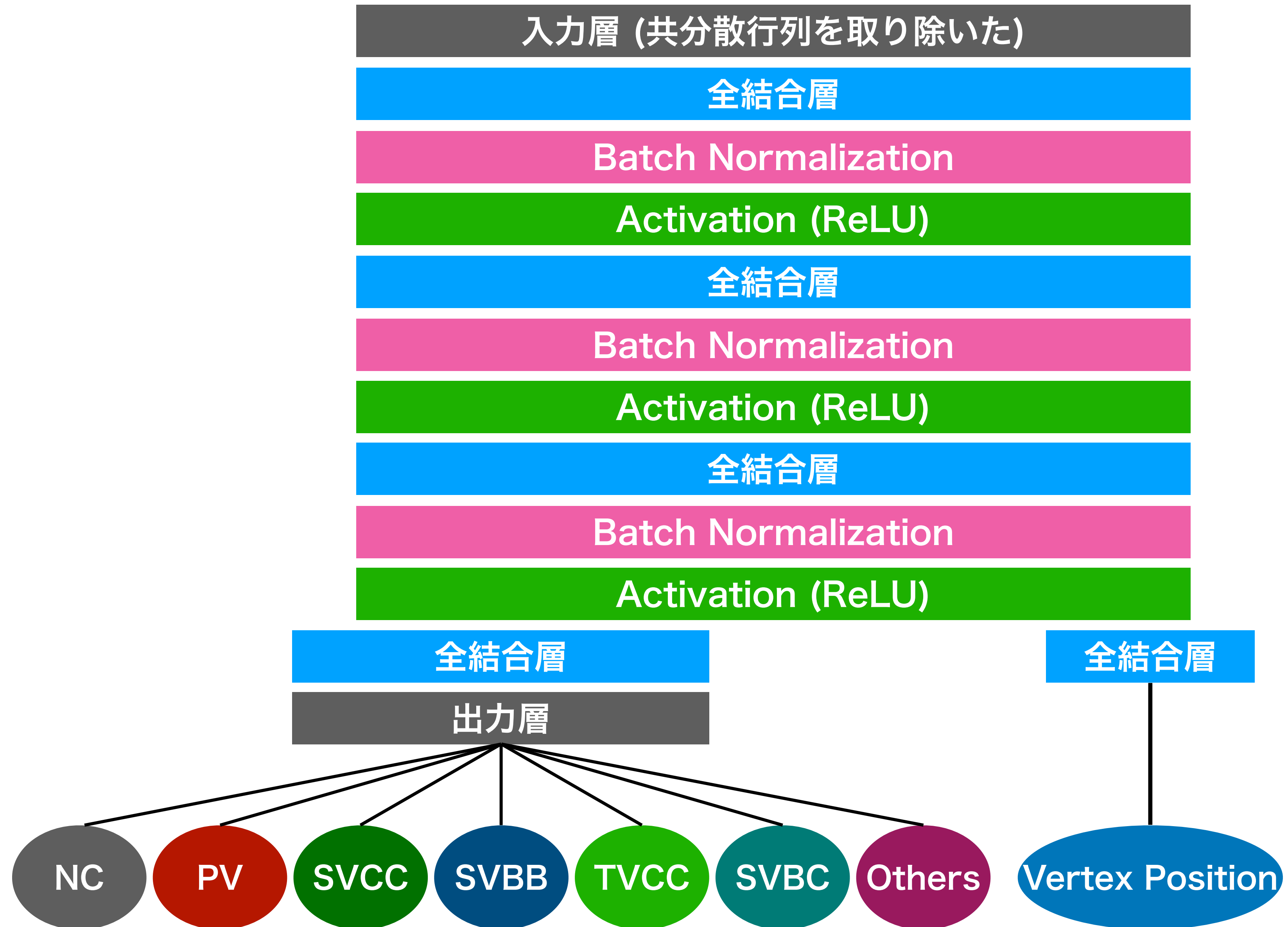
データサンプル $c\bar{c} - 03, 04, b\bar{b} - 04, 05$











Loss

Efficiency Matrix

Purity Matrix

Vertex Position

Loss

相对值
Efficiency Matrix

相对值
Purity Matrix

Vertex Position

相对值
Efficiency Matrix

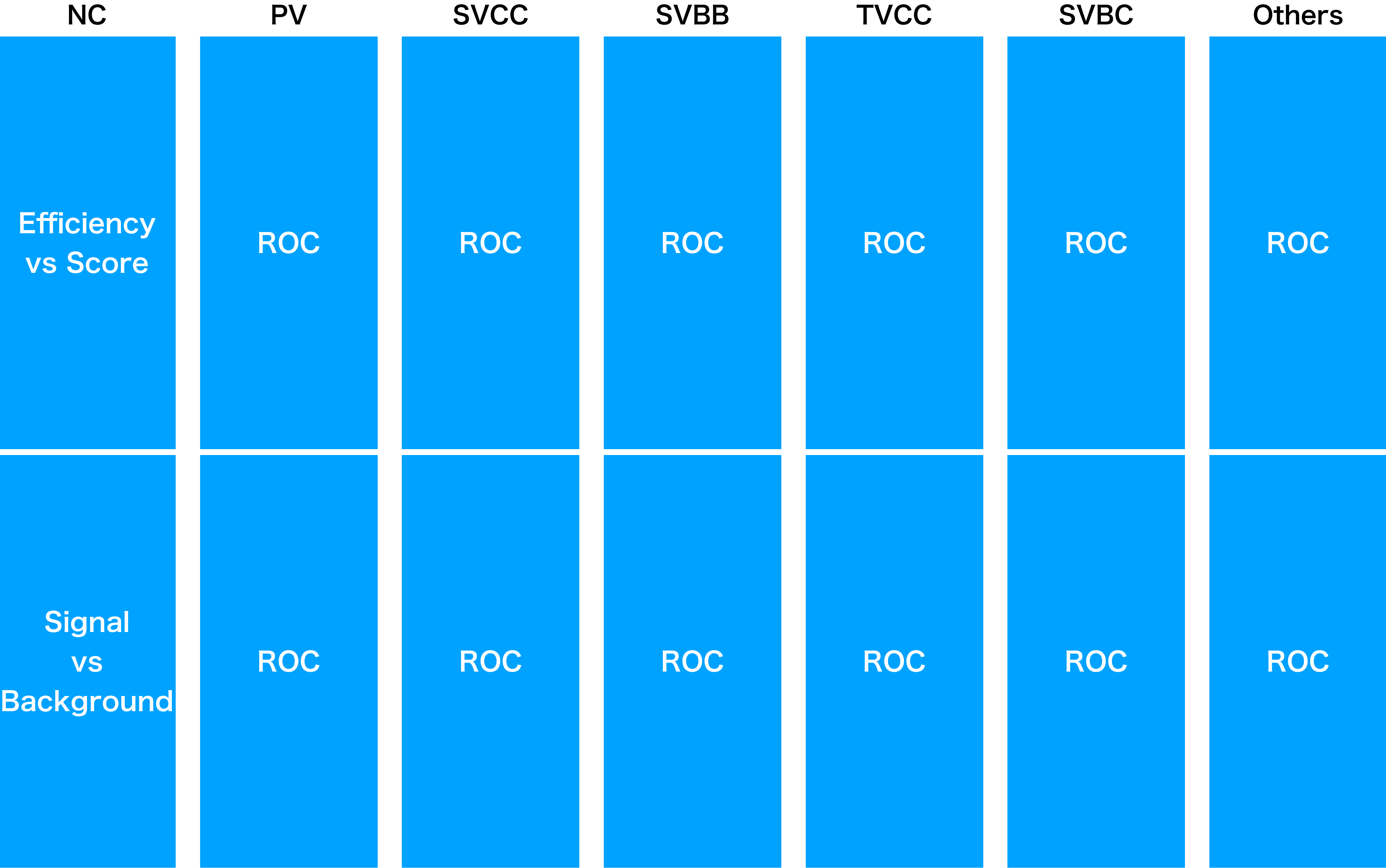
相对值
Purity Matrix

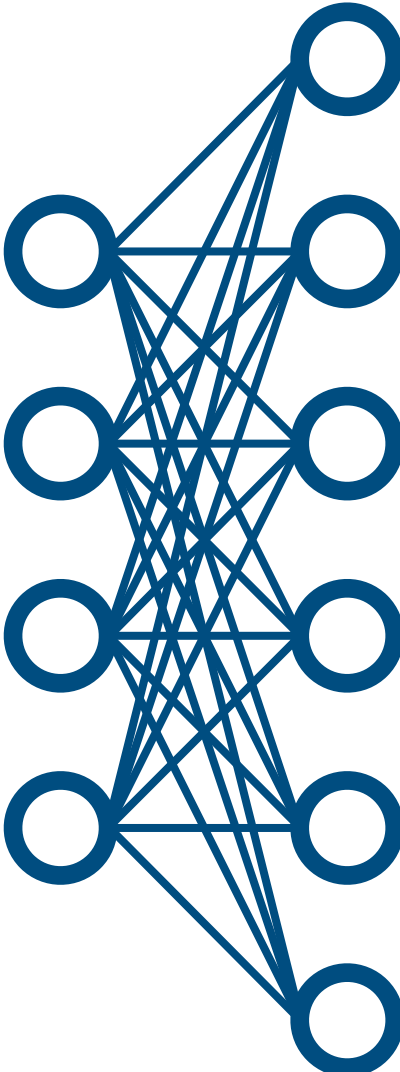
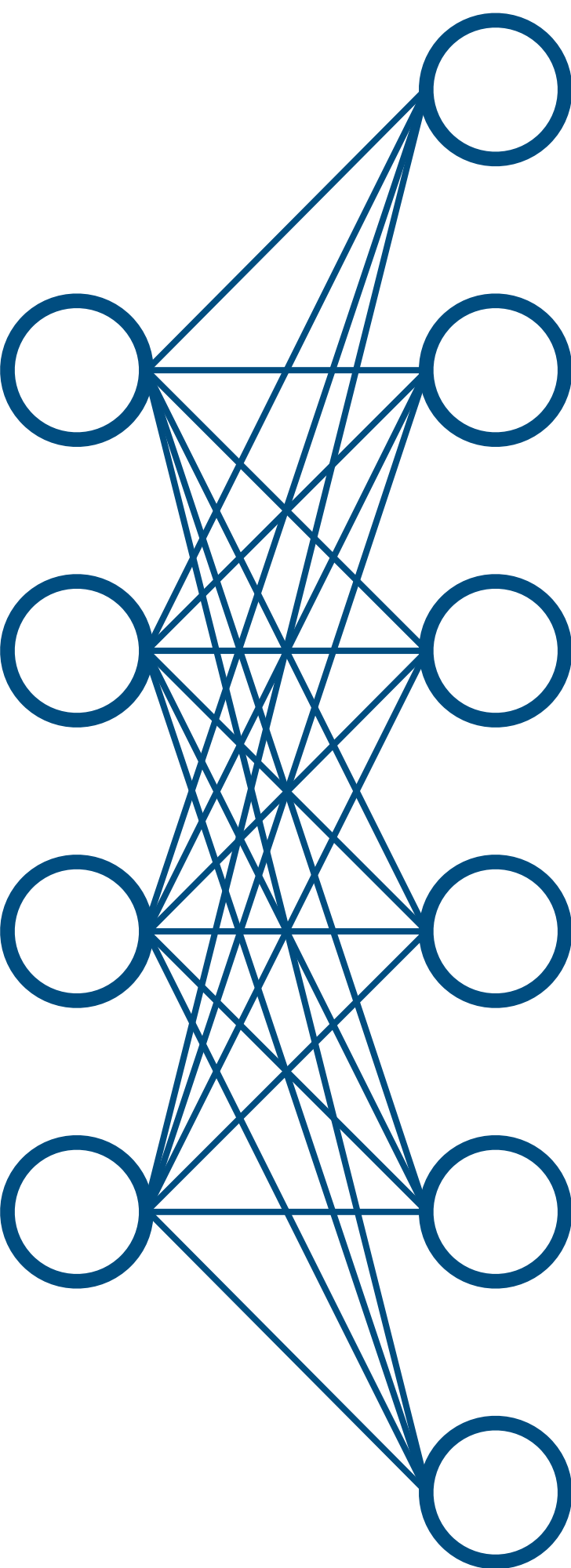
Loss

相对值
Efficiency Matrix

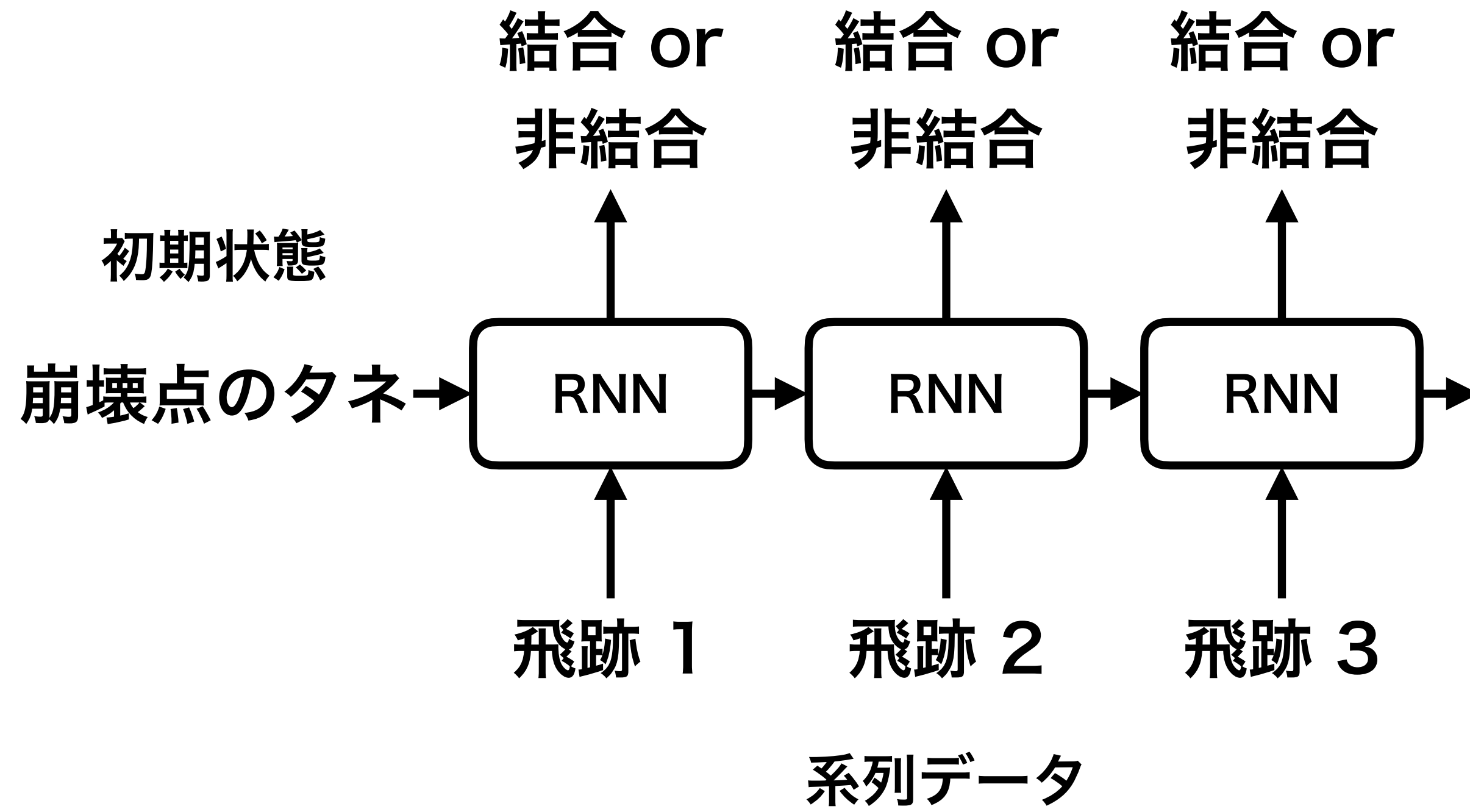
相对值
Purity Matrix

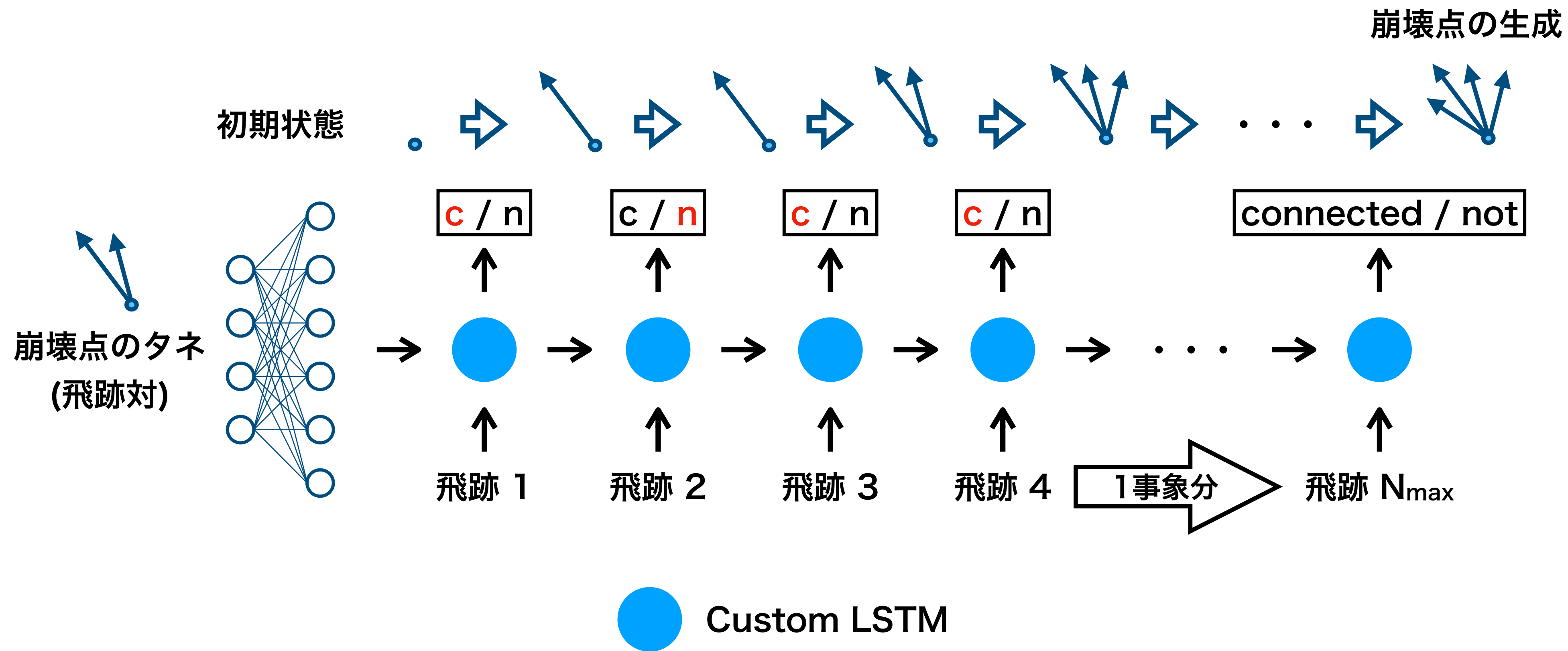
Vertex Position

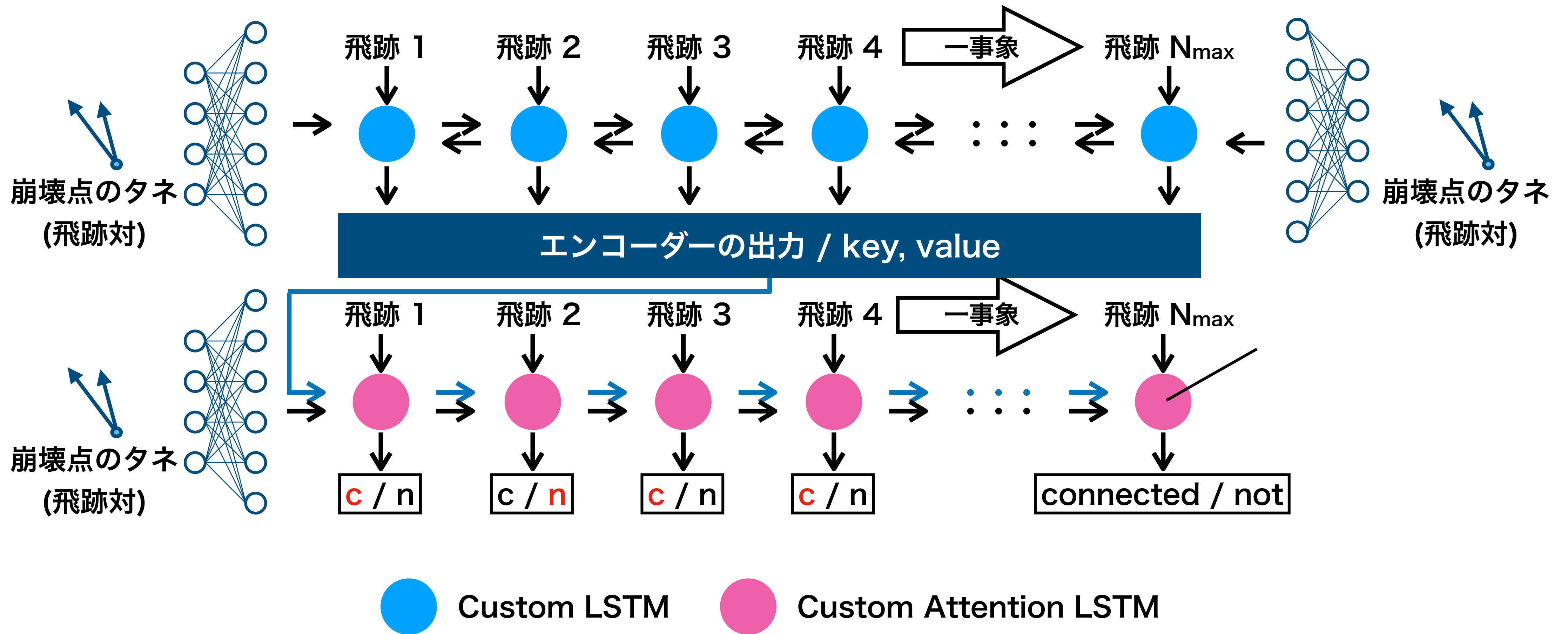




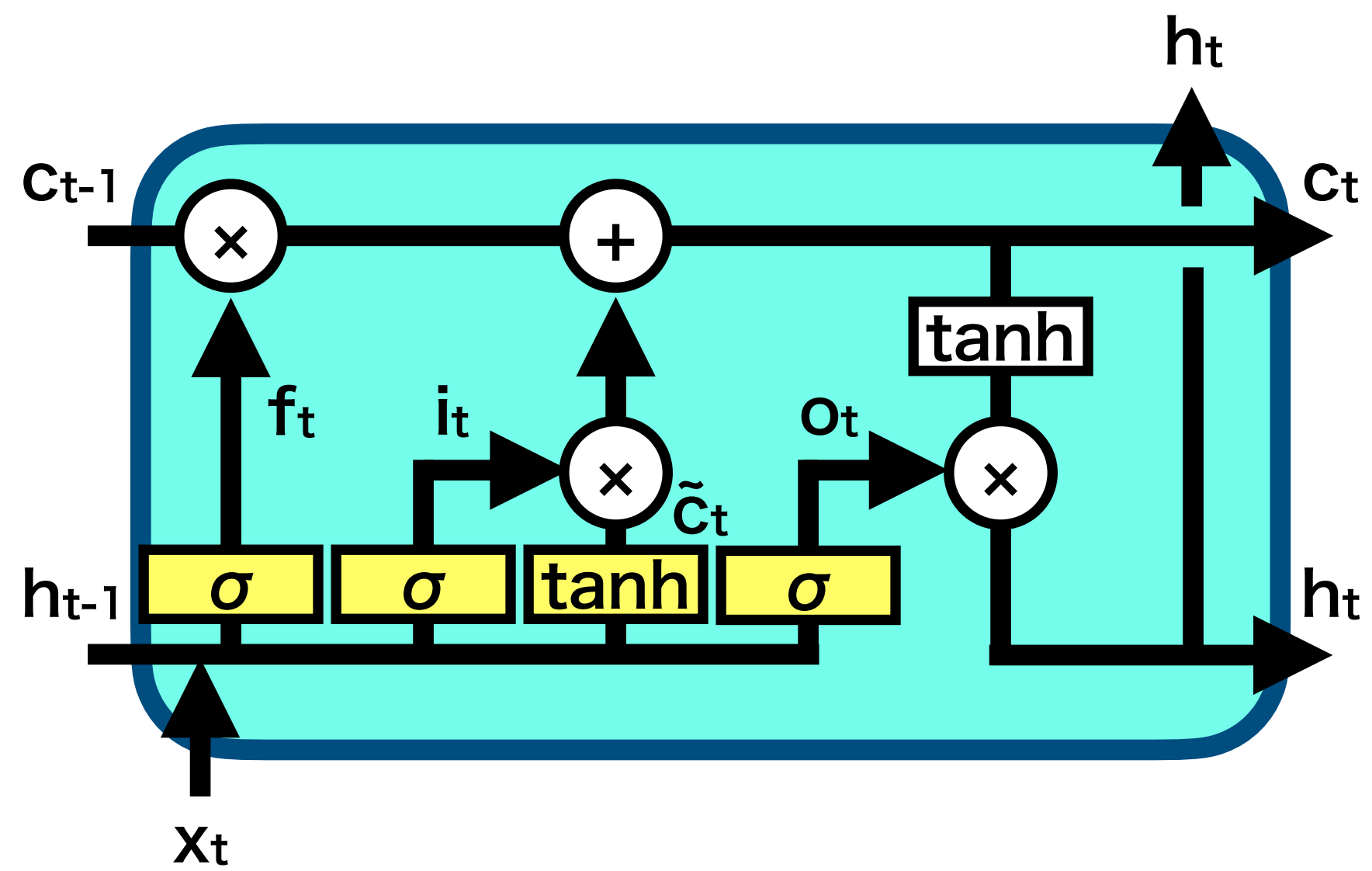
Many to Many



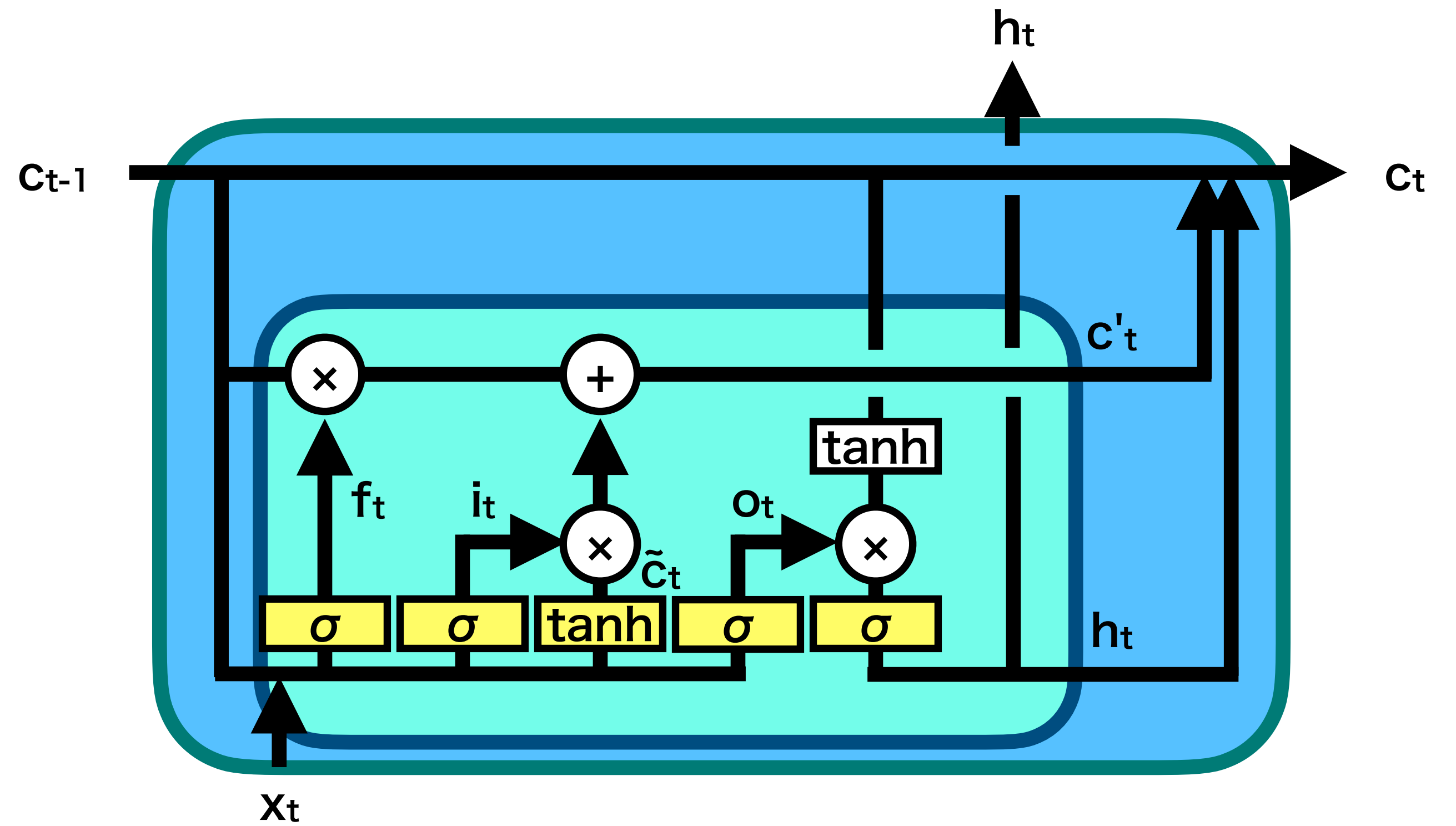


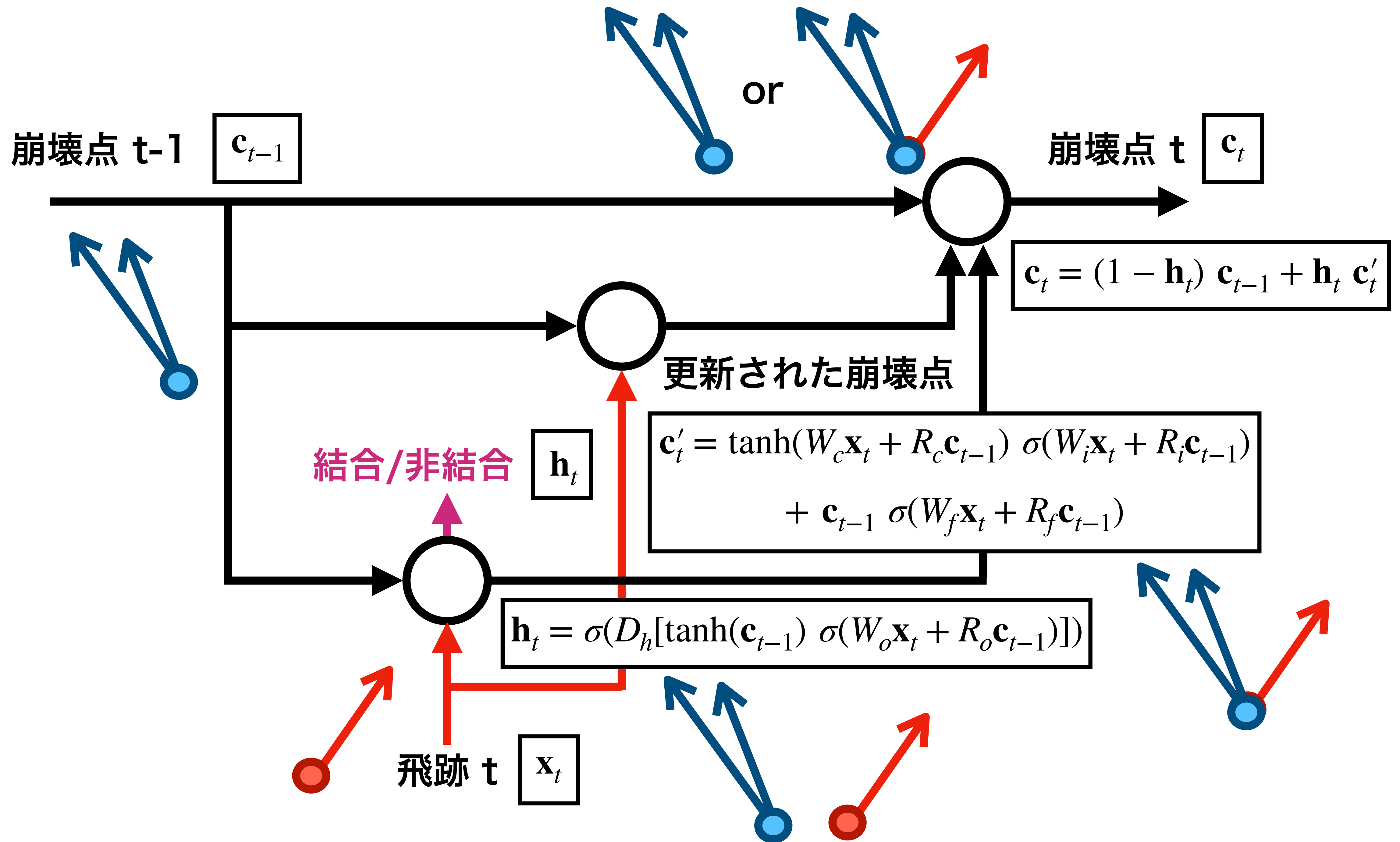


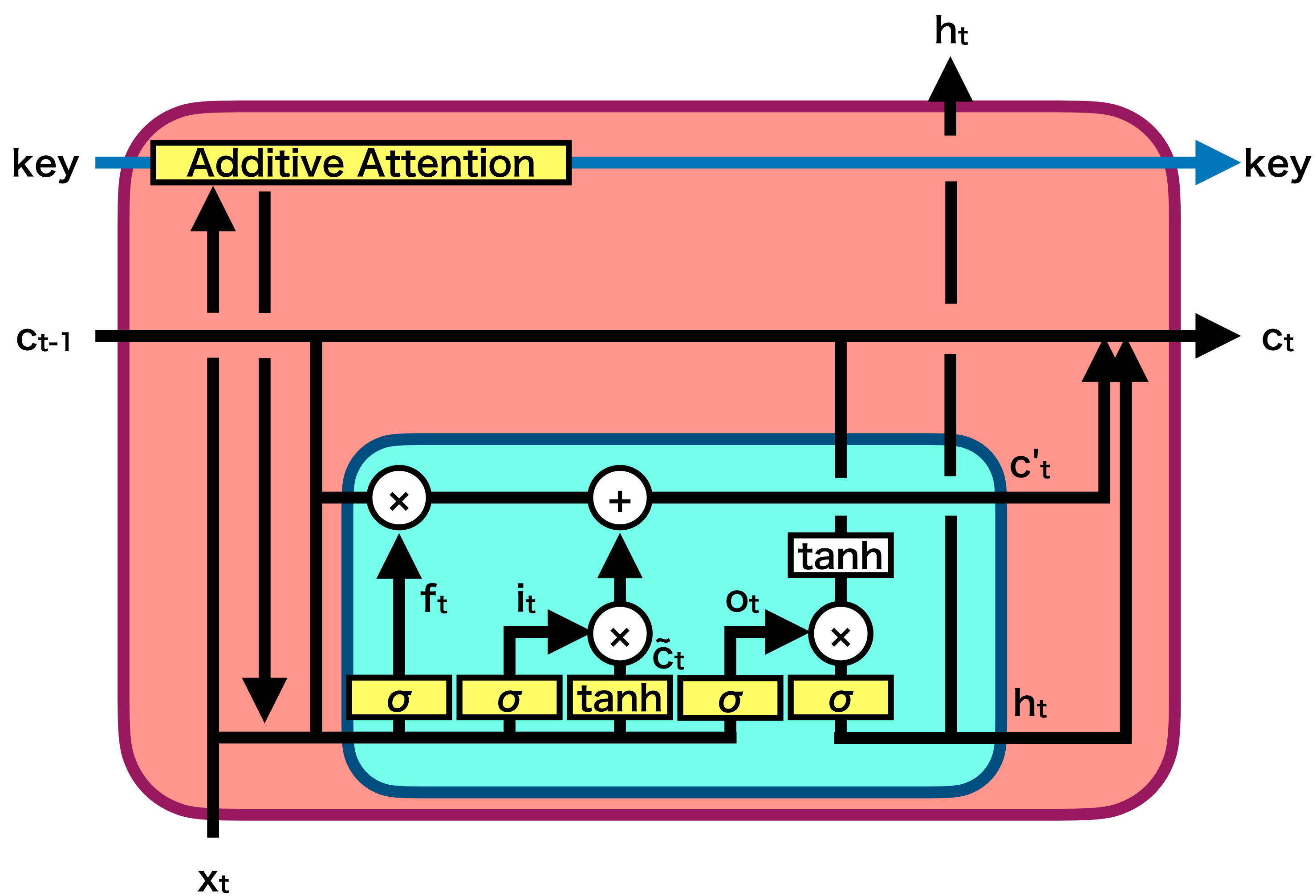
LSTM



崩壊点生成のための リカレントニューラルネットワーク

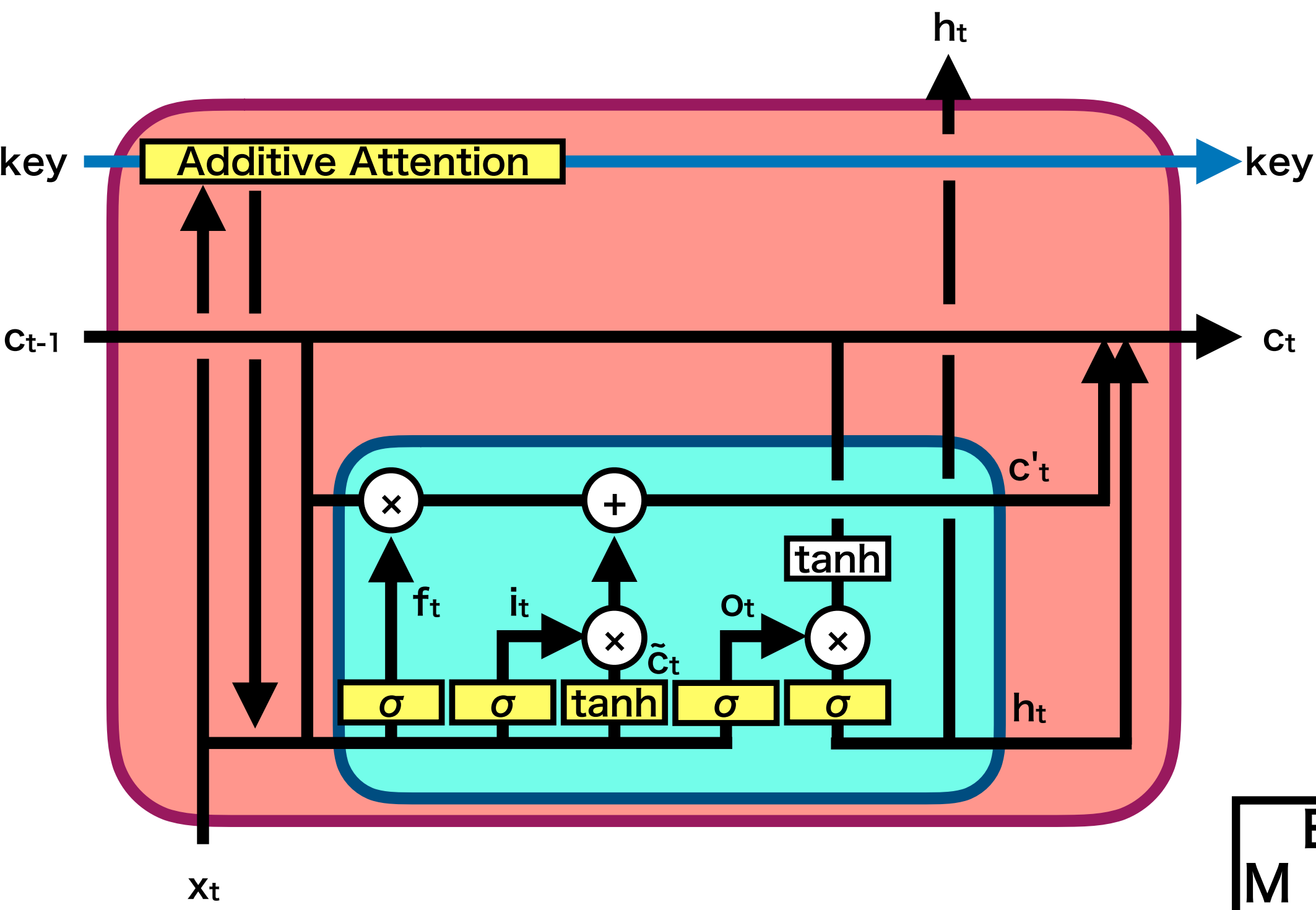






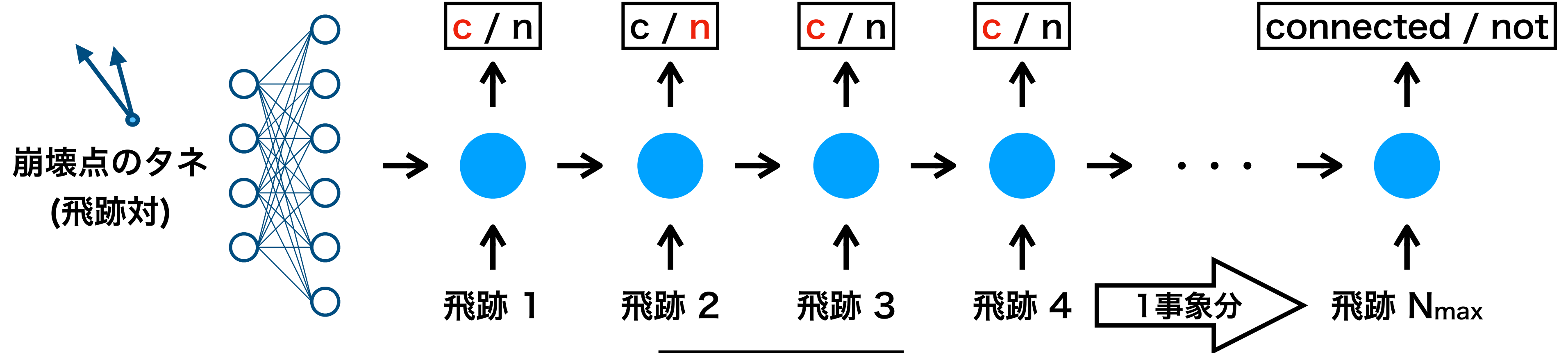
$$\begin{pmatrix} \mathbf{u}_{\text{energy}} \end{pmatrix} \left[\begin{pmatrix} \text{key} \\ \mathbf{K} \end{pmatrix} \begin{pmatrix} U_{\text{key}} \end{pmatrix} + \begin{pmatrix} \text{query} \\ \mathbf{x}_t \\ X_t \end{pmatrix} \begin{pmatrix} U_{\text{query}} \end{pmatrix} \right] = \begin{pmatrix} \mathbf{e}_t \end{pmatrix}$$

$$\begin{pmatrix} \sigma(\mathbf{e}_t) \end{pmatrix} \begin{pmatrix} \text{value} \\ \mathbf{v} \end{pmatrix} = \begin{pmatrix} \alpha_t \end{pmatrix} \begin{pmatrix} \text{value} \\ \mathbf{v} \end{pmatrix} = \begin{pmatrix} \gamma_t \end{pmatrix}$$

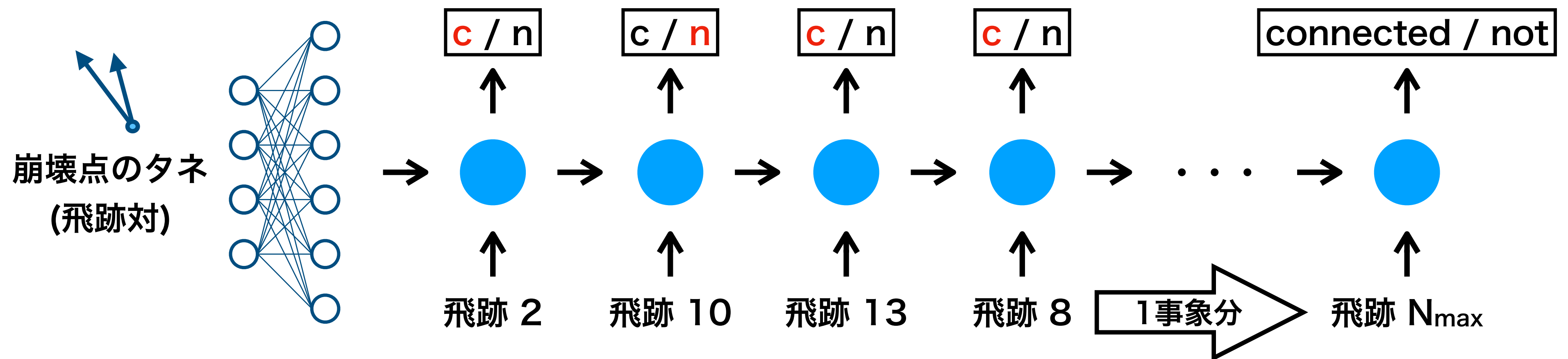


$$\begin{aligned}
 & \text{key} \quad \text{query} \\
 & \left(\mathbf{u}_{\text{energy}} \right) \left[\left(\mathbf{K} \right) \left(U_{\text{key}} \right) + \left(\begin{pmatrix} \mathbf{x}_t \\ X_t \end{pmatrix} \right) \left(U_{\text{query}} \right) \right] \\
 & = \left(\mathbf{e}_t \right)
 \end{aligned}$$

$$\begin{aligned}
 & \text{key} \quad \text{重み} \quad \text{query } N * M \quad \text{重み} \\
 & \begin{bmatrix} M & E \end{bmatrix} \begin{bmatrix} E & D \end{bmatrix} + \begin{bmatrix} M & F \end{bmatrix} \begin{bmatrix} F & D \end{bmatrix} = \begin{bmatrix} M & D \end{bmatrix} \\
 & \begin{bmatrix} M & D \end{bmatrix} \begin{bmatrix} D \end{bmatrix} = \begin{bmatrix} M \end{bmatrix} \quad \text{attention weight } N \quad \frac{\exp(e)}{\sum \exp(e)} \quad \begin{bmatrix} M \end{bmatrix} \begin{bmatrix} M & E \end{bmatrix} = \begin{bmatrix} E \end{bmatrix} \\
 & \quad \text{重み} \quad e \quad N \quad \text{value} \quad \text{context } N
 \end{aligned}$$



1エPOCH後



飛跡順のシャッフル