Errata

Kodansha Blue Backs "Origins of the Universe and Matter: Understanding the Invisible World"

We will sequentially list the errata discovered after the publication.

1. Page 272, Fig. 9-3: Add 0 to the bottom of the second plot from the top.

2. Page 272, Fig. 9-3, second vertical axis label: “（Number of Events - bkg Number of Events）” ⇨” (Number of Events - bkg Number of Events) / GeV”.

Fig.9-3_original should read Fig.9-3_revised: (Refer to the 2 red parts in Fig.9-3_revised)

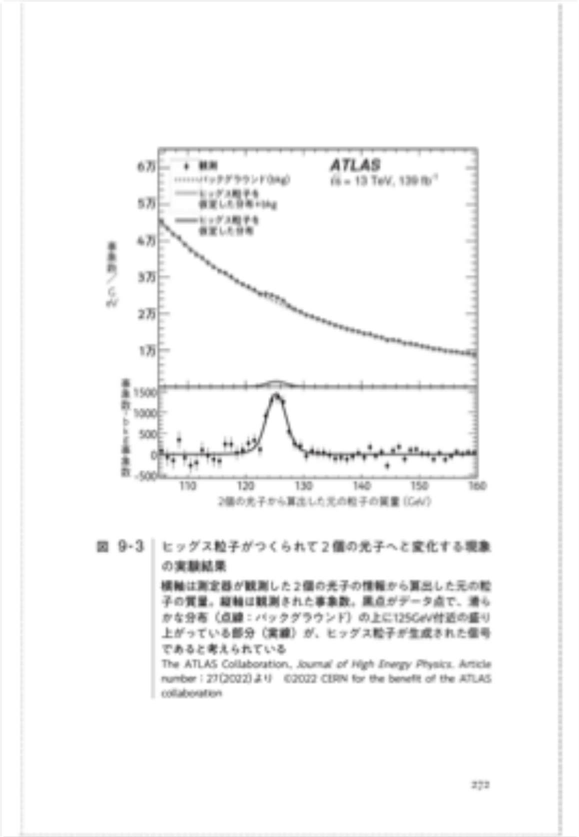
6万
5万
4万
3万
2万
1万
事象数／GeV
観測
バックグラウンド(bkg)
ヒッグス粒子を仮定した分布+bkg
ヒッグス粒子を仮定した分布
ATLAS
√s = 13 TeV, 139 fb⁻¹
事象数−bkg事象数
1500
1000
500
0
-500
110
120
130
140
150
160
2個の光子から算出した元の粒子の質量（GeV）

図 9-3　ヒッグス粒子がつくられて２個の光子へと変化する現象の実験結果

横軸は測定器が観測した２個の光子の情報から算出した元の粒子の質量。縦軸は観測された事象数。黒点がデータ点で、滑らかな分布（点線：バックグラウンド）の上に125GeV付近の盛り上がっている部分（実線）が、ヒッグス粒子が生成された信号であると考えられている

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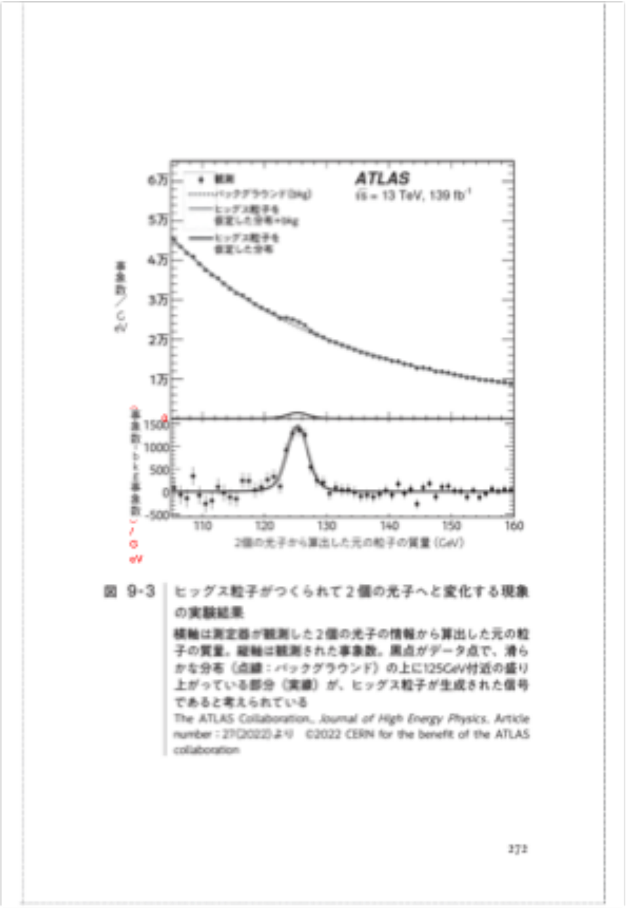
Fig.9-3_orignal


観測
バックグラウンド(bkg)
ヒッグス粒子を仮定した分布+bkg
ヒッグス粒子を仮定した分布
ATLAS
√s = 13 TeV, 139 fb⁻¹
6万
5万
4万
3万
2万
1万
0
1500
1000
500
0
-500
110
120
130
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2個の光子から算出した元の粒子の質量（GeV）

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Fig.9-3_revised

3. Page 15, Table of Contents for Chapter 3, second-to-last subheading:” Candidate celestial bodies where the r-process occurs: Supernova explosions and neutron mergers” ⇨”Candidate celestial bodies where the r-process occurs: Supernova explosions and neutron star mergers”

4. Page 119, subheading: “Candidate celestial bodies where the r-process occurs: Supernova explosions and neutron mergers” ⇨ “Candidate celestial bodies where the r-process occurs: Supernova explosions and neutron star mergers”

5. Page 308, third line from the bottom: "Error to consider, "⇨ "Considering the error,"

The following corrections, 6. to 18., pertain to index information.

6. Page 314, fourth line in the left column of index items, Multiverse Hypothesis: 301 ⇨ 299

7. Page 314, 24th line in the left column of index items, Quantum Fluctuations: 132 ⇨ 233

8. Page 315, sixth line in the right column of index items, Non-Perturbative Limit: 292 ⇨ 290

9. Page 316, 32nd line in the left column of index items, Dark Energy Problem: 262 ⇨ 261

10. Page 316, first line in the right column of index items, Dark Matter: 242 ⇨ 240

11. Page 316, sixth line in the right column of index items, Grand Unified Force: 287 ⇨ 285

12. Page 316, 22nd line in the right column of index items, Superconducting State: 287 ⇨ 285

13. Page 316, 22nd line in the right column of index items, Grand Unified Force: 287 ⇨ 285

14. Page 317, 23rd line in the left column of index items, Cosmological Constant Problem: 262 ⇨ 261

15. Page 318, 16th line in the right column of index items, J-PARK ⇨ J-PARC

16. Page 318, 22nd line in the right column of index items, LHC (Large Hadron Collider): 272 ⇨ 270

17. Page 318, 30th line in the right column of index items, r-process (rapid neutron capture process): 113⇨ 112

18. Page 318, 32nd line in the right column of index items, s-process (slow neutron capture process): 113⇨ 112

19. Page 9, second line: "European Organization for Nuclear Research" ⇨ "European Nuclear Research Organization"

20. Page 157, Line 1: "and its square is,"⇨ "and the square of its absolute value, which is proportional to the probability of existence, is,"

21. Page 157, Line 2: $z^2 = (a + ib)(a - ib) = a^2 + b^2$⇨ $|z|^2 = (a + ib)(a - ib) = a^2 + b^2$

22. Page 158, Line 6: $z^2 = r^2(\cos(\theta) + i \sin(\theta))^2 = r^2(\cos^2(\theta) + \sin^2(\theta)) = r^2$⇨ $|z|^2 = r^2|\cos(\theta) + i \sin(\theta)|^2 = r^2(\cos^2(\theta) + \sin^2(\theta)) = r^2$

23. Page 158, Line 7: "because z^2, which is the probability of the electron's position, does not change."⇨ "because $|z|^2$, which is proportional to the probability of the electron's position, does not change."
24. Page 269, Line 1: $\phi_1(x,y,z,t)$⇨ $\varphi_1(x,y,z,t)$
25. Page 269, Line 2: $\phi_2(x,y,z,t)$⇨ $\varphi_2(x,y,z,t)$
26. Same Page 269, Line 2: “the magnitude of energy, $(|\phi_1|,|\phi_2|)$”⇨ “the magnitude of energy, $(|\varphi_1|,|\varphi_2|)$”
27. Same Page 269, Line 4: “values of the field $(|\phi_1|,|\phi_2|)$for the complex Higgs fields ϕ_1 and ϕ_2”⇨ “values of the field$(|\varphi_1|,|\varphi_2|)$ for the complex Higgs fields φ_1 and φ_2”
28. Page 96, Line 1: “age of the universe is approximately one-billionth of a second” ⇨“age of the universe is approximately one ten-billionth of a second”
29. Page 96, Line 2: “higher than approximately 100 billion degrees” ⇨“higher than approximately 1 trillion degrees”
30. Page 96, Line 2: “approximately 30 cm in size. ⇨“approximately 3 cm in size”

31. Page 187, Line 13-14 and page 188 line 1 to 7:

Let’s express "Person A borrows money from Person B" as $A + (+m) = B$. In this context, "Person B lends money to Person A" can be represented as $A = B + (-m)$. Here, mm denotes the amount of money involved in the transaction. Through this interaction, Person A's amount of money increases, so it is denoted as $+m$, while Person B's amount decreases, represented as $-m$.

If we label $-m$ as a "lending particle" and $+m$ as a "debt particle," we can observe that, although the monetary value is the same, the interpretation changes depending on the perspective: from Person B's viewpoint, it is a "loan," while from Person A's viewpoint, it is a "debt." These perspectives are inversely related. This relationship between the "lending particle" and the "debt particle" mirrors the relationship between particles and antiparticles.

⇨

The expression "Person A borrows m yen from Person B" indicates that A's possession increases by m yen, resulting in $A+(+m)$. On the other hand, the expression "Person B lends m yen to Person A" means B's possession decreases by m yen, resulting in $B-m=B+(-m)$. Although these represent the same transaction, in the first expression, A's possession increases by $+m$, while in the second expression, B's possession decreases by $-m$.

If we name $-m$ the "lending particle" and $+m$ the "borrowing particle," we can see that these particles represent the same amount but from different perspectives. For B, it is a "lending particle," while for A, it is a "borrowing particle." Thus, depending on the observer's perspective, they are exactly reversed. This relationship between the "lending particle" and the "borrowing particle" mirrors the relationship between particles and antiparticles.

32. Page 307, Line 19-21:

After completing the doctoral program (later stage) in the Graduate School of Science at Nagoya University in March 1988, the individual served as a Special Research Fellow of the Japan Society for the Promotion of Science (JSPS) at Nagoya University.

⇨

After completing the doctoral program (later stage) in the Graduate School of Science at Nagoya University in March 1988, earning a Doctor of Science degree. Subsequently, the individual served as a Special Research Fellow of the Japan Society for the Promotion of Science (JSPS) at Nagoya University.

Dec. 2nd, 2024
IPNS, KEK