

Decoding beauty

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Propositions accompanying the dissertation

Decoding beauty

Lex Marinus Greeven

1. The study of beauty baryon decays provides complimentary information to the more commonly studied beauty meson decays, and is essential for a complete understanding of the Standard Model of particle physics.
2. Due to their small Standard Model branching fraction, the rare $\Lambda_b^0 \rightarrow \Lambda \ell^+ \ell^-$ decays are excellent probes for indirectly searching for New Physics contributions at high energy scales.
3. The measurement of $\Lambda_b^0 \rightarrow \Lambda \ell^+ \ell^-$ decays is not possible without correcting the available simulation to match the data, which is a complicated and error-prone process.
4. The use of branching fraction single- and double ratios using the resonant $\Lambda_b^0 \rightarrow J/\psi \Lambda$ and $\Lambda_b^0 \rightarrow \psi(2S) \Lambda$ decay channels is a powerful tool to verify the analysis methods and highlight potential issues.
5. The commissioning and calibration of a new detector is a long, arduous, and often overlooked process, but it is essential for the success of any detector.
6. Performing independent analyses measuring the same quantity is a powerful cross-check of the analysis methods and results, and allows for finding and correcting mistakes.
7. When trying to understand an issue, it is preferable to start by testing low-level quantities than to start by checking the applied high-level methods.
8. "Science is a way of thinking much more than it is a body of knowledge."

- Carl Sagan

9. "All we have to decide is what to do with the time that is given us."

- J.R.R. Tolkien