

Isospin Strikes Back

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The decay of a charmonium vector meson $c\bar{c}$ into the $\Lambda\bar{\Sigma}^0 + \text{c.c.}$ state can be considered purely electromagnetic under the assumption of isospin conservation. The first-order interaction is therefore mediated by a virtual photon, similar to the non-resonant process $e^+e^- \rightarrow \Lambda\bar{\Sigma}^0 + \text{c.c.}$ in the Born approximation. Given the nature of these two processes, any discrepancy between their measurements can be attributed to an isospin-violating contribution in the charmonium state decay.

Thanks to its high luminosity and the large amount of collected data, the BESIII collaboration has recently reported the measurement of the decay ratio $\text{BR}(\psi(2S) \rightarrow \Lambda\bar{\Sigma}^0 + \text{c.c.})$, which represents the first-ever measurement of this process and is currently published in the Particle Data Group.

Using this data, along with the decay ratio for the J/ψ state and the cross-section values for neutral baryon-antibaryon pair production, it is possible to extract the electromagnetic coupling value from both measurements independently. In this presentation, we will discuss the BESIII result and demonstrate the procedure for quantifying the extent of potential isospin violation. We will conclude that the experimental measurement obtained by the collaboration excludes the presence of significant isospin violation phenomena in the decay $\psi(2S) \rightarrow \Lambda\bar{\Sigma}^0 + \text{c.c.}$

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