A Coincidence Algebra Bundle for Decay Quivers: An Algebraic Approach to Gamma-ray Spectroscopy.

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Motivated by the need for a more comprehensive algebraic structure to calculate coincidence probabilities of a general decay scheme for gamma ray spectroscopy, we model the decay scheme, rather naturally, as a quiver through which we define a decay quiver. The path algebra of quivers is the underlying, more general, algebra for transition matrices that is typically used in modeling decay schemes. The path algebra allows for concatenation of transitions which affords the calculation of cascade probabilities. We extend the path algebra to allow for the multiplication of non-composable paths, i.e., transition that don't directly share a level connecting them. We define the coincidence algebra as the algebra that allows for such an extension and realize it as the fibres for a coincidence algebra bundle, the base space of which is the path algebra where decay schemes live. Detection maps are defined as linear maps on the base space that map transition probabilities to detected probabilities.

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