



## PROGRAM NOTES

Developed in the early twentieth century, quantum mechanics is the science of the very small. The main tenets of quantum theory describe interactions among atoms and sub-atomic particles. Its sister science, particle physics, deals with the identification and classification of fundamental sub-atomic particles and their interactions. The Standard Model is the classification system devised by particle physicists to categorize the known fundamental particles. One may consider it to be the sub-atomic version of the familiar Periodic Table of Elements used in chemistry.

This model groups particles into three categories: quarks, leptons, and force-carrying bosons. While quarks make up the protons and neutrons found at the center of atoms, leptons include particles like the electron that allow atoms to interact with each other. The bosons, then, are particles that govern the interactions of quarks and leptons. Consider the following analogy: quantum mechanics and particle physics are like a grand dramatic narrative that plays out at the sub-atomic level. Quarks and leptons, then, are characters within this drama, and bosons are the plot devices that allow these characters to interact.

**The Standard Model** is a set of character pieces for wind band based on the model in particle physics. The music intends to imply a perceived personality for each particle with an almost cinematic sense of wonder and awe. It is divided into three movements, corresponding to the three categories found within the model. After a brief prologue representing the creation of particles in the big bang, movement one characterizes the quarks as the stodgy and square building blocks of matter. The music reflects the colorful names scientists have given to the quarks. The second movement describes the leptons – the electron collection and its twin, the electron neutrino collection. One may think of these two sets of particles as twin siblings at a party. While the electron revels in its role as the life of the party, the electron neutrino would be found sitting in a corner as the classic wallflower living vicariously through its sibling. The attentive listener will discover several references to the works of influential electronic musicians in the popular realm.

The bosons set the stage in the third movement as the quark and lepton characters within the dramatic narrative play out their interactions with each other. While the music in this movement is specific to describing the bosons, themes from the previous two movements appear along the way. A final coda represents the yet-to-be-discovered Higgs boson, also known as the God particle. By invoking some artistic license, this particle's nickname references back to creation in the prologue and allows for a tidy conclusion to the piece in the form of a somewhat traditional glorified plagal "Amen" cadence.

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