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Diphoton Higgs decay in an U(1)′ model

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At present, the possible confirmation by the LHC of a scalar particle identified as the Higgs boson has increased the study of its different decay channels, where the diphoton decay is one of the most prominent processes, because of the excess reported by LHC. These excesses may be associated with new symmetries in models beyond the standard model. In particular, family non-universal U(1)' symmetry models have many motivations to be considered, because they involve a large number of phenomenological consequences and theoretical aspects as flavor physics, physics of neutrinos, dark matter, among other effects. These models also involve a new neutral boson Z', something else new anomalies appear. It is necessary to extend of the fermionic spectrum in order to obtain a chiral theory free of anomalies. On the other hand, the new symmetries require extended scalar sectors to generate the spontaneous breaking of the new Abelian symmetry and to get masses for the new gauge boson Z' and the extra fermionic content. In particular, the scalar sector is extended with two scalar doublets and two singlets, where one of the singlets is postulated as a dark matter (DM) candidate. The purpose of this work is to calculate the new contribution to the diphoton channel decay width of the Higgs, as it offers a clear signal of new physics associated with the scalar sector, where loop contribution from charged Higgs bosons are taken into account. Also, since the signal strength depends on the ratio with the total of Higgs boson decay, it is possible to evaluate the effects of a light DM component as an invisible final state.

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Measurements with diverse concepts in quantum/particle physics

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Much of particle physics uses data from new measurements, average measured properties of gauge bosons, leptons, quarks, mesons and baryons; there are many that are new or heavily revised including those on quark-mixing matrix, top quark, muon anomalous magnetic moment, extra dimensions, particle detectors, cosmic background radiation, dark matter, cosmological parameters and big bang cosmology. The model is based on gauge theories, of which the first was quantum electrodynamics, describing the interactions of light with matter. The core element of particle physics analysis as the name suggests is the physical characteristics that form the basis of the measurement. Decoherence theorists, who use various non-standard interpretations of quantum mechanics that deny the projection postulate quantum jumps and even the existence of particles, define the measurement problem as the failure to observe superpositions such as Schrödinger's cat. Measurements are described with diverse concepts in quantum physics such as; wave functions/probability amplitudes, evolving unitary and deterministic/preserving information, according to the linear Schrödinger equation, superposition of states, i.e., linear combinations of wave functions with complex coefficients that carry phase information and produce interference effects/the principle of superposition, quantum jumps between states accompanied by the "collapse" of the wave function that can destroy or create information, probabilities of collapses and jumps given by the square of the absolute value of the wave function for a given state, values for possible measurements given by the eigenvalues associated with the eigenstates of the combined measuring apparatus and measured system. The expected consequence of Niels Bohr's "Copenhagen interpretation" of quantum mechanics, was to explain how our measuring instruments, which are mostly macroscopic objects and treatable with classical physics, can give us information about the microscopic world of atoms and subatomic particles like electrons and photons. Some define the problem of measurement simply as the logical contradiction between two laws describing the motion of quantum systems; the unitary, continuous, and deterministic time evolution of the Schrödinger equation versus the non-unitary, discontinuous, and indeterministic collapse of the wave function. Here, I intend to present a unified dynamics framework using particles connected by constraints as the fundamental infrastructure that let us treat measurements in a unified manner.

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